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The Sir Richard Stawell Oration.¹

MEDICAL ASPECTS OF RED CROSS IN THE SECOND WORLD WAR.

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Melbourne.

THE Sir Richard Stawell Oration was established by its founder to preserve the memory of one of the greatest of Australian doctors, whose death occurred just ten years ago. Six of those years have seen the greatest world war of all time—the aftermath of the war in which Sir Richard Stawell rendered such distinguished service. In the war just ended he has been represented by his only son, Dr. John Stawell.

I was a student of Stawell's and that was a great privilege. After more than forty years I still remember the awed hush of expectancy and excitement when word went round the hospital that "Dicky's here". Then would follow a clinical demonstration, unequalled by any teacher I have ever seen at work. After I graduated, Stawell became to me the ideal physician, one to whom I could go in confidence, in consultation or in great relief for help in sickness in my own family. To those who had the honour and privilege to know Stawell as leader, colleague, doctor or friend, it is not necessary to stress the qualities of the man. He has become a tradition of that generation. For those who were denied that privilege, perhaps the

picture of "the Chief" in "In Hospital", by William Ernest Henley, will serve in some degree:

His brow spreads large and placid, and his eye
Is deep and bright with steady looks that still,
Soft lines of tranquil thought his face fulfil,
His face at once benign and proud and shy.
If envy scant, if ignorance deny
His faultless patience, his unyielding deny,
Beautiful gentleness and splendid skill,
Innumerable grattitudes reply.
His wise, rare smile is sweet with certainties,
And seems in all his patients to compel
Such love and faith as failure cannot quell,
We hold him for another Heracles,
Battling with custom, prejudice, disease,
As once the son of Zeus with Death and Hell.

May his influence and example long pervade and glorify the traditions of Victorian and Australian medicine!

When my fellow trustees did me the honour of asking me to deliver the tenth Sir Richard Stawell Oration, it was suggested that I should speak of the work of the Australian Red Cross Society in the late war. Stawell found time to take part in voluntary organizations related to the work of the medical profession, and it is not inappropriate that the war work of the largest voluntary organization in Australia should be the theme of a Stawell oration.

The second world war, which ended with the surrender of the Japanese forces on August 15, 1945, presented the Red Cross movement with even greater opportunities for service than the first world war. But its true functions have not been generally appreciated. Because of the manner of its origin eighty-one years ago, and of its close association with the work of the medical services, the Red Cross Society stands apart from philanthropic organizations whose services cover the welfare of fit and well troops. At the conclusion of the war of 1914 to 1918 the countries

¹ Delivered at a meeting of the Victorian Branch of the British Medical Association on October 17, 1945. Received for publication January 18, 1946.

signing the League of Nations Covenant pledged themselves to encourage the formation of national Red Cross societies which would devote their energies towards the prevention of disease, the improvement of health and the mitigation of suffering, while maintaining their traditional purpose of organizing to give free voluntary aid to the sick and wounded in war. The International Red Cross Committee grants recognition only to such national societies as receive approval from their governments and are recognized as official auxiliaries to the medical services of the armed forces. The Australian Red Cross Society, founded on August 13, 1914, and granted a Royal Charter in 1941, conforms to these necessary conditions.

BASIS OF MEDICINE.

There is a close affinity between the purpose of medical practice and the objects of the Red Cross Society. It has been said that the primary objects of the medical profession are to prevent and cure disease, to ease pain and to save life. "Medicine", wrote Sir William Osler, "arose out of the primal sympathy of man with man, out of the desire to help those in sorrow and sickness", and "the basis of medicine is sympathy and the desire to help others, and whatever is done with this end must be called 'Medicine'". The presence of this sympathy can be traced through recorded history. The Order of Saint John of Jerusalem organized aid for the sick and wounded from the twelfth century on. The first convention for the protection of wounded in battle was devised by the British physician General Sir John Pringle, during the War of the Austrian Succession in 1742. But Florence Nightingale and Henri Dunant are mainly responsible for the modern organization of voluntary aid in the care of war casualties.

DEFINITION OF FUNCTIONS.

No specific definition of the purposes of an official auxiliary has been laid down. These were developed on the experience of past wars and in consultation between army medical directorates and Red Cross officials. But as the Red Cross Society is recognized by governments as the official voluntary auxiliary of the medical services, it is clear that the functions and purposes of the Red Cross must conform to those of the services.

In "The Australian Army Medical Services in the 1914-1918 War", Colonel A. Graham Butler defines the army medical service as a highly complex social group, "at once a *technical military service*, exactly organized, established and trained for maintaining the army's strength for the achievement of victory; a *scientifically equipped social service*, cooperating with the various civil agencies in effecting the repair and reenablement of the war-damaged soldier, and a fully accredited humane agency for promoting and cooperating in the alleviation of suffering". This is a wide definition and seems to call for the assistance of such a voluntary auxiliary as the Red Cross, especially in relation to the two last-mentioned purposes. It can and should be said, in relation to the Second World War, that the medical services have in a most distinguished manner fulfilled all the purposes set out by Butler. Many of Stawell's students and successors have shared in this fine record, which would have greatly delighted him. How proud, for example, would he have been of Neil Fairley and his associates in their winning fight against tropical diseases, which contributed so greatly to the ultimate victory of the Allied forces! And with what admiration would he have learnt of the magnificent deeds of Coates, Brennan, Dunlop, Hunt and others in Japanese prison camps, or of Le Souef, Moore and many doctors in European prison camps! The service nurses share in the medical achievements of the war, and no greater epic of heroism exists than the courageous manner in which Australian nurses met their deaths in Sumatra at the hands of a murderous and inhuman foe. The reputation of our medical and nursing services stands deservedly high throughout the world. The Red Cross Society has been proud to assist them in every operational area as far forward as the regimental aid posts.

Butler listed the overseas activities of the society in the First World War, broadly as follows:

1. Provision of material: (a) extra equipment, stores, foodstuffs and so forth, for the use of the medical services; (b) extra comforts for the patients themselves, in particular tobacco; (c) means of transport, as ambulance wagons; (d) furnishings for convalescent homes and hostels; (e) other material.
2. Provision of facilities for reparative and vocational training and for recreation.
3. Visitation of patients in hospitals.
4. As an agency for the Australian Comforts Fund, as far as comforts for the medical services, especially the nursing service, were concerned.
5. Non-medical activities under the Geneva Convention and Hague agreements: (a) action in respect of prisoners of war; (b) the tracing of missing soldiers and communication with their relatives.

Except with reference to the Australian Comforts Fund, that description could be adopted in relation to the recent war. The society strictly limited its services to the sick and wounded and prisoners of war, although it provided group comforts for the nursing personnel. In accordance with its international obligations it also rendered aid to enemy prisoners of war who were under the care of Australian doctors. Many of the comforts issued were produced by the devoted labour of tens of thousands of workers amongst the three thousand branches of the society spread throughout the Commonwealth and its dependencies. The service was rendered by a field force consisting of five hundred men and women. Most of the men had served as combatants, whilst the women, known variously as hospital visitors and field hospital officers, were specially selected and trained. Each military hospital had attached to it Red Cross officers and other ranks, all incorporated in the army and subject to military law. In the mainland hospitals the service was supplemented by voluntary Red Cross unattached workers. This personal service was given also on hospital ships, ambulance trains and aerodromes.

ORGANIZATION.

Owing to the location in Melbourne of defence headquarters, the Red Cross Society has always had its central body in this city. It is controlled by a national council elected by State divisions of the society, together with some ex-officio and coopted members. The ex-officio members include the directors-general of the medical services of the armed forces. Until the outbreak of war, Major-General R. M. Downes, then Director-General Medical Services of the Army and the Royal Australian Air Force, was chairman, and he was succeeded by Dr. Victor Hurley, who later became Director-General Medical Services of the Royal Australian Air Force.

The first committee appointed at the outbreak of war was the Medical Services Committee, which included not only ex-officio medical members of the council, but the Principal Medical Officer of the Repatriation Department, the Commonwealth Director-General of Health and other medical men of prominence. It is now under the able guidance of Dr. W. W. S. Johnston as chairman and Dr. G. Robinson as Director. Similar committees exist in State divisions. There has been definite medical guidance in the affairs of the society.

PRE-WAR PREPARATIONS.

Soon after the Munich crisis in September, 1938, the International Red Cross Committee warned all national Red Cross societies to organize to a war-time level, and the Australian Red Cross Society appointed a planning committee under the leadership of Dr. Victor Hurley. A "Red Cross War Book" was prepared with the approval of the Director-General Medical Services of the army, and the plans were put into operation at the declaration of war. The chapters of the war book described the authority under which the society acts, both nationally and internationally, and dealt in detail with the various matters of interest in the society's activity, such as stores, personnel, transport, auxiliary hospitals, inquiry work and

service to prisoners of war, while one chapter dealt with the details of hospital improvisation and blood transfusion.

EQUIPMENT IN SERVICE HOSPITALS.

Although much thought had been given to the war-time needs of this country, Australia was unprepared when hostilities commenced. This was true of the medical services, which had few whole-time officers and little or no hospital accommodation or equipment. In July, 1938, the Commonwealth Government set up a committee under the chairmanship of Major-General R. M. Downes to coordinate all matters relating to the medical needs of the country, military and civilian, in the event of war within Australia. The information acquired by that body indicated that a considerable amount of the needs must be met at first by a process of improvisation.

None of the excellent camp hospitals and magnificent base hospitals now existing had been erected. Little expenditure had been incurred to prepare for a national emergency that might not happen. Even in the early months of mobilization expenditure seemed to be niggardly in regard to the medical needs of the forces, and permission to acquire equipment was apt to be subject to long delays. It was then that the Red Cross Society, untrammelled by regulations, played a significant part in assisting the medical services.

The society commenced its war service without funds, but with a certain small amount of stores remaining from the war of 1914 to 1918. Public support was soon forthcoming, money donated amounting ultimately to more than £12,000,000. The Stores Department, on the basis of previous experience and in consultation with army medical officers, compiled a list of some eight hundred items of equipment, hospital furnishings, clothing and comforts considered suitable to supplement the official equipment scale for the care of sick and wounded. As military hospitals became organized, specific requests from individual medical officers became frequent. Official issue of items desired by them but outside the adopted scale was refused or delayed, and the Red Cross Society provided a more rapid channel of approach. It was soon found necessary, both by the Equipment Control Officer and by the society, to reach an understanding and to arrive at a formula.

Every establishment has an official scale of issues which is based upon experienced opinion as to needs. It is a minimum scale rather than a maximum scale, and, being official, is applied in strict accordance with regulations. The Red Cross Society is not responsible for providing basic equipment for hospitals. Only if the need is one of immediate urgency should supplies which should be issued by the authorities be sent to hospitals. The Red Cross Society should, it was determined, supplement the scale only when by its so doing increased efficiency of service could be given, or when urgency required official rules to be ignored, or when rapid replacements were essential owing to war casualties. It was laid down as a general principle that the funds of the society were not expended upon equipment which the State should provide as a necessity.

Experimental Equipment.

It is not always easy to amend an official scale nor to add to it. Improved instruments may be desired or are devised by medical officers, but no provision is made for experimental expenditure. Here the Red Cross Society was able to help. The most noticeable example was in mobile units, for blood transfusion, for surgical teams, for bacteriological work. The unit is constructed at the expense of the society. If it proves worthy of use, it may or may not become an official issue. Requests for such equipment always had official endorsement, and the blueprints were prepared and the construction supervised by service medical officers. For example, early in the war a mobile transfusion train was constructed at the request of the then Transfusion Officer, Colonel Ian Wood, and the Equipment Control Officer, Colonel Wallace Ross, both of whom supervised the construction. Intense interest was aroused in this first unit, which was shipped to the Middle East, but

sad to relate, never arrived there. Four such units were later built.

Each suggestion was considered carefully and subjected to the tests laid down. Special orthopaedic fracture apparatus was constructed for one hospital, and clinical photographic equipment for another, whilst plaster bandage machines, sterile water units and portable X-ray units were made and supplied in the early years of the war to the navy, army and air force medical establishments. Tools for repairing instruments were asked for and given, as no adequate official provision was made at the time, and this gift proved of great value in the Middle East and led to similar requests from other hospitals. A giant magnet was requested by an oculist of a general hospital. None was available, so an effective instrument was made in Australia, under the supervision of the oculist himself.

Other Equipment.

Libraries for the staffs of military medical units were not liberally allowed for in the early days, and the society took some part in meeting this need. This service was also aided by the British Medical Insurance Company of Victoria.

Care was taken, as far as possible, to refrain from catering for the special hobbies of individual officers, who desired to have at their disposal all the apparatus they had been accustomed to using in their civilian work, instead of adapting themselves to official equipment scales. Medical officers found that asking officially and getting things were generally quite unrelated happenings, so they applied to the Red Cross.

Ownership of Equipment.

The matter of ownership of equipment issued to hospitals by the society created some difficulty. After the previous war, some individual officers claimed the society's gifts for their own use, and the late Sir Neville Howse characterized this as a great abuse. It was decided to adopt the principle for the war that all equipment would be issued to the unit on loan, remaining the property of the society. The final result of this action, no doubt, will cause some problems when the goods are called in.

Comforts.

Red Cross stores in operational areas contained large reserve stocks of prepared dressings, rolls of old linen (favoured by nurses), rolls of gauze, leno for plaster work, and bandages. These were included on the basis of previous experience and were the product of organized teams, including former members of the Australian Army Nursing Service. There is evidence to prove that at times they were a very present help in time of trouble. But most of the hospital equipment was provided for the direct benefit of the patients themselves and was legitimately classed as "comforts". The men were frequently under the misconception that they were normal issues. The main idea was that the men must not suffer, and if the society could in any reasonable way lessen the suffering and aid in hastening recovery, it had a duty to do in which it must not fail. Many of the comforts could have been regarded as essential, but they just were not provided officially, although they were certainly valued on behalf of the patients by medical officers and nurses alike. The items were numerous, ranging from personal requisites to furniture and floor coverings.

It may be thought that all food requirements for patients in medical establishments would at all times be adequately catered for and available. Medical comforts and light diets in the early days of the war could, it was stated, be obtained if asked for, although not laid down on a definite scale as an issue. No service that the Red Cross Society provided was more useful than its "light diets". In every theatre of operations they were declared by hospital staffs to have proved essential, while in the New Guinea campaigns they were of life-saving value. In the last year of the war the society was officially requested to cease issuing these light foods, and medical officers and nurses were ordered not to use them, as official scales were

adequate. But even then the society's stores were used. Florence Nightingale once said: "It is one thing to have goods in the quarter-master's store, but it is another matter to get them." Even the fresh eggs and fruit sent by the society via Royal Australian Air Force planes to various points in New Guinea failed to meet all the needs for these articles. The total list of articles made available by the society reads like the stock list of a general store.

SPECIAL REQUESTS FOR RED CROSS SERVICE.

While no special functions are laid down for the Australian Red Cross Society as an official auxiliary, its existence provides an organization to which the medical corps can direct specific requests for aid. Much of the war work done by the society followed requests of this nature, such as the establishment of convalescent homes, the employment of medical social workers, and the provision of blood serum and of a rehabilitation service in hospitals.

Convalescent Homes.

Dunant's improvised voluntary aid on the battlefield of Solferino included the utilization of a village church as a casualty hospital, and ever since then the establishment of auxiliary hospitals in war time has been a recognized objective in Red Cross work. This service is included in the Royal Charter of the Australian Red Cross Society. The British Red Cross War Organization in both world wars conducted many such institutions, although neither the Canadian nor the American society was called on in this regard. Towards the end of 1939, after a conference of deputy directors of medical services from the several military districts, the Director-General Medical Services requested the society to establish convalescent homes for the after-care of service patients. The first and largest convalescent home was opened in Victoria at "Stonnington" in May, 1940, with a bed capacity of 150. Thirty-two such homes were ultimately opened in Australia, as well as one at Port Moresby and one at Colombo, and a rest home for nurses at Jerusalem. A contract was let for the erection of a convalescent home for the Eighth Division in Malaya, and work had just started when the Japanese forces overran the Malay Peninsula.

Eight of the homes accommodated women only, one was for officers and one was devoted solely to the rehabilitation of psychiatric patients. The society was responsible for the selection and equipping of the buildings and for the staffing of the homes. Trained nurses were appointed in charge of whole-time or part-time Red Cross aids or voluntary aids. Amenities, handcraft materials and instruction, and apparatus for physical therapy were also supplied, subject to approval by the Deputy Director Medical Services. The Australian Army Medical Corps was responsible for medical care and records, admissions and discharges, and discipline. The convalescent homes were thus organized as part of the military hospital system; they were conducted by the Red Cross Society, but for all practical purposes were under the control of the Director-General Medical Services and his staff. For a great part of the war there were available 1,357 beds, supplementary to those in the various base hospitals. The stay of the men was usually relatively short, and the treatment given was essentially that applicable to recovery of medical and surgical patients no longer confined to bed. No training or "hardening up" was carried out as in a convalescent depot, and the type of care given, with its relaxation of the discipline of a regular service hospital, proved beneficial to the thousands of military patients who were accommodated, while the homes provided a useful reserve of beds for the medical officers.

Blood Transfusion Service.

Transfusion of blood and blood derivatives assumed large proportions in the resuscitation of battle casualties, and it has been assigned a high priority as a life-saving procedure. For ten years prior to the outbreak of war, a blood transfusion service was a Red Cross activity in Australia. Commencing in Melbourne in 1929, on the

suggestion of the late Lieutenant-Colonel E. L. Cooper, then medical superintendent of the Royal Melbourne Hospital, it spread gradually to divisions in Western Australia, Queensland and Tasmania, and during the war, to New South Wales and South Australia. Recently a service has been established in the Northern Territory.

The pioneer service in Victoria, under the direction of Dr. Lucy Bryce, commenced by organizing blood donors for individual transfusions; the service also undertook testing and grouping of blood. In 1938 it set up a blood bank, the first in Australia. As the threat of war developed, an emergency service was instituted on the initiative of Dr. Bryce and Colonel Ian Wood. Early in 1940 pooled blood was obtained from these emergency donors and processed into liquid serum, for the first time in Australia, at the Commonwealth Serum Laboratories. Until the middle of 1942 all the serum sent from Australia to the Middle East and Malaya came from this source.

In July, 1942, Major-General F. A. Maguire and Colonel C. H. Kellaway requested the society to cooperate with the Australian Army Medical Corps on a national basis in developing a transfusion service to meet all military and civilian needs. At that time invasion of Australia was imminent. Combined army and Red Cross units were formed in each State, and an elaborate scheme of organization was developed to deal with any civilian casualties consequent upon enemy action. A large and active service was set up at the Sydney Hospital, which provided the greater part of the serum for service purposes. However, serum was produced also in Queensland and Western Australia, as well as in Victoria. Plants for drying serum were set up in Sydney and Adelaide, and for small-scale experimental work in Melbourne. Pooled serum, wet and dry, thus provided, has been available for civilian as well as for service needs, and has been supplied to the Royal Navy and the Royal Australian Navy, to the Allied forces and to merchant service vessels, as well as to New Zealand, Fiji, Samoa and the Flying Doctor service.

The Red Cross Blood Transfusion Service has endeavoured to meet all needs and to keep pace with progress, and other aspects may be summarized as follows.

1. Donors with high-titre serum (anti-A and anti-B) were selected for use in blood group tests. Serum from these donors, which is processed at the Commonwealth Serum Laboratories, was used for the testing of many thousands of members of the defence forces.

2. Panels of "Rh-negative" donors were established and suitable anti-Rh serum was provided. In a consultative capacity, especially in Victoria, New South Wales and Western Australia, the Red Cross service has been able to enlist the cooperation of obstetricians and paediatricians, thus securing satisfactory supplies of serum for processing.

3. Special products, such as red cell suspensions and concentrated serum, have been supplied for therapeutic purposes on an experimental basis in recognized clinical schools.

4. Original investigations have been published from time to time in medical and scientific journals by Red Cross medical officers and technicians.

5. Individual donors are supplied to practitioners who prefer to take blood from donors immediately before use or to employ special methods.

6. From the latter end of 1942, whole blood, Group O, was sent by air transport from the Queensland and New South Wales services, in specially designed ice-boxes, for use in military hospitals, both Australian and Allied, in the South-West Pacific area.

7. Blood banks have been set up in civilian hospitals in many towns in Australia and suitable stocks of serum are maintained in many country hospitals. The Red Cross Transport Service has frequently been used to meet rapid emergency needs, both in cities and in the country. This has proved of special value in such disasters as the bush-fires in Victoria in 1944.

8. In order to investigate the newer developments in transfusion work, the society sent Dr. Lucy Bryce and Miss M. Bick to the United States of America early this

year. Miss Bick is at present working in the laboratories of Professor Cohn, in Boston, on the technique of serum fractioning and the study of the increasing value of serum globulins.

The general coordination of these transfusion services and the formulation of national policy is vested in a National Blood Transfusion Committee within the Medical Services department of the society. The committee includes senior officers of the defence medical services, pathologists, and transfusion and refrigeration experts from all States of the Commonwealth. A technical subcommittee exists to deal in detail with, keep abreast of, and report on scientific and technical problems and developments. These committees meet several times each year.

The society has determined to continue for the benefit of civilians the widened basis of operations developed to meet war-time needs, provided financial support is forthcoming and the interest and cooperation of donors can be maintained. This latter factor is the essential basic consideration, and time only will tell whether this sacrifice of blood by tens of thousands of Australians, so readily available in periods of national emergency and danger, will be equally available for life-saving and preventive purposes in the quieter days of peace.

The service is a costly one to organize and maintain, and no charge is made by the Red Cross Society for any help it gives. Doctors who use the service freely have never been prominent in helping to keep it going or in obtaining donors. Blood transfusion has become an essential factor in meeting resuscitation and other needs. It is assuming greater importance in the prevention and treatment of some of the infectious diseases. It must be organized on a permanent basis, and it is thought that the Red Cross Society is the best body to continue the work. Already the Victorian Division, in cooperation with the Royal Melbourne Hospital, is building a Red Cross donor centre and associated laboratories, and similar expenditure is contemplated in other parts of Australia. This is being done in the hope that the wonderful voluntary service and the sustained devotion of donors, so freely offered to save the lives of the fighting forces, may be available to preserve these men, their wives and children, during the long years of civilian reconstruction.

The medical profession should be the most energetic helpers of the society in this life-saving enterprise. Probably also the society will be compelled to request a government subsidy to take care of financial aspects if the blood and serum are to continue to be supplied free of cost to the patient.

Rehabilitation of Disabled Service Personnel.

Towards the end of the war of 1914 to 1918 the then newly constituted Repatriation Commission requested the Red Cross Society to provide facilities for occupational therapy. The service then started was maintained in repatriation institutions in the years between the two world wars. Materials and workshops were provided, together with instructors, by means of which the men in hospitals, sanatoria and mental institutions learned the methods of basket-making, cabinet work and other craft work, not only as a diversion but as an aid to restoration of health.

During the Middle East campaign, at the request of the army, the Red Cross women hospital visitors commenced handcraft instruction which served to some extent as occupational therapy, under the direction of medical officers.

In March, 1941, the Adjutant-General asked the Red Cross to participate in rehabilitation work within Australia. The society was asked to act as agent for the Army Education Service, and as liaison between the medical officer and education service and between the patient and the education service, and also to provide handcrafts for relief of tedium. Medical social workers were appointed as liaison officers and to supervise and coordinate the handcraft work. Similar functions were also accepted on behalf of the Royal Australian Air Force Rehabilitation Section.

Although it was appreciated that, where hospital patients were concerned, medical social workers could suitably perform a liaison function for the education service, the desirability of the direct importance of medical social work as part of medical treatment was apparent from the outset, and the Directors-General of Medical Services of the Army and the Royal Australian Air Force considered this early in 1943. They decided that medical social work should be one of the facilities afforded by their medical directorates, believing that more flexibility could be achieved if such workers were not enlisted service personnel. Accordingly it was decided that they should be Red Cross personnel working under the commanding officers of hospitals. The Director-General Medical Services, Royal Australian Air Force, further expressed the view that Red Cross medical social workers could give continuity where medical officers wished to have a "follow-up" of patients after their discharge from hospital.

In July, 1943, an army instruction made Red Cross medical social workers directly responsible to the medical services and no longer required them to function as agents for the education service. At the same time Red Cross handcraft workers were made responsible to army occupational therapists. Instructions from the army and the Royal Australian Air Force gave Red Cross medical social work an official position in hospitals. Similar work was undertaken for the navy. This set-up allowed greater specialization in medical social case work under the medical officers' direction. In military hospitals, where matters that confront the civilian almoner (such as arranging for special diets or other matters often affected by the need for financial aid) do not arise, the patient as an individual becomes more isolated as the main subject of medical social work. Attention is then directed to problems of psychological adjustment to illness or disability, when the medical officer considers this will contribute to the patient's recovery and to securing the constructive acceptance of the patient's situation by his family. Perhaps for such reasons Red Cross medical social workers are most used in psychiatric cases and in those in which mental disturbance is associated with some other condition. In the obtaining of social histories at the medical officer's request the national set-up of the Red Cross service allows information to be easily obtained from other States when necessary. This is done on a considerable scale at one large psychiatric unit (114th Australian General Hospital). Medical social workers may also assist with post-discharge plans for those leaving the services and provide follow-up investigations under medical guidance. At large hospitals it has been found that rapid turnover in staff and patients makes attention to individual problems difficult.

At the end of 1943, it was apparent that there was a great need for some care to be given to service personnel discharged as medically unfit but not accepted for benefits from the Repatriation Commission; the policy of the society was changed to provide case work service for this class. Previously only those accepted by the commission had been within the scope of Red Cross service. Thus Red Cross social service is now available to all service members in hospital and discharged on medical grounds. For the latter, social service departments of the Red Cross are established in all capital cities.

Service in both the hospital and the post-discharge fields is carried out in cooperation with other agencies, it being recognized that the Red Cross Society is responsible for the sick and wounded and those discharged as medically unfit. Commonwealth departments are now beginning to develop a trained social worker staff, but as the supply of workers that are even now needed will not be available, close liaison will be necessary.

The society has accepted a proposal from the Director-General of Manpower for the seconding of Red Cross social workers for individual follow-up of selected disabled ex-service personnel at a stated period after their first placement through the Commonwealth Employment Service. The object is to prevent serious maladjustments which might prove difficult to eradicate, and also to provide

the opportunity to explore individual needs as a basis for further development from that stage.

In November, 1944, "Gilbulla" Rehabilitation Farm was established by the society in New South Wales. This is a residential rehabilitation centre for men who, after medical treatment, have some residual difficulty, either organic or psychological, through which they are not yet fit to take up training or return to a civilian job. Cooperation with the Repatriation Commission and the Commonwealth Department of Social Services is maintained.

Beginning with a proposal from the army in 1943, that the society should help to meet the extreme shortage of trained workers by subsidizing students in medical social work, the Red Cross Society has developed a scholarship scheme in social service, through which 48 students have undertaken training. This number includes three senior workers who have been granted scholarships to the Mental Health Course of the University of London. As a further contribution to the development of what is a young profession in Australia, the society has agreed to provide for a period subsidies to the Universities of Sydney, Melbourne and Adelaide, to improve training facilities in social work.

In 1932 the Victorian Council of Social Training was formed. Sir Richard Stawell was its first chairman, and showed great interest in what was then a new form of training. When he retired he asked me to succeed him. Now this body is merged with the Board of Social Studies at the University of Melbourne. It is certain that Stawell would have been delighted with the progress of the organization which he so ably started and with the valuable contribution made by trained social workers during the war.

HANDCRAFT SERVICE.

The handcraft service was developed as a separate operation. In general hospitals in Australia, Red Cross activity in this regard comprised, under the scheme approved by the Adjutant-General and the Director-General Medical Services, assistance to the occupational therapists who were appointed by the forces, to the extent that medical officers may call upon Red Cross for assistance in doing everything possible to relieve the tedium of patients in hospital.

The organization of this service was placed in the hands of a well-trained director of handcrafts. She was responsible also for the teaching of Red Cross hospital officers, each of whom was required to undergo a fixed minimum period of training. Training centres were set up in each State with a central school in Melbourne. The director was required also to maintain a steady flow of materials to forward areas and base hospitals alike. Owing to the few suitably trained occupational therapists, some hospitals were without the service of these valuable officers, while in forward areas Red Cross officers were responsible only for providing diversional therapy. The absence of occupational therapy departments often led medical officers to rely on Red Cross workers to carry out prescribed remedial work. This development laid on the Red Cross Society the obligation to give to its field hospital officers the best possible training in handcraft work.

The development of the handcraft service during the war was proof of its value to patients in hospitals from base to forward areas. In the base areas it was guided by professional handcraft workers, aided by teams of voluntary workers. Its remedial value, apart from the relief of tedium, was soon apparent.

The standard of work required was decided by the need of patients and by medical advisers who knew what was best for each patient. Experience showed, for example, that a craft like weaving, with many fields to be explored, was far more valuable to a long-term patient than to a short-term patient, keeping him mentally alert as well as fully occupied. Leather work, with stimulus of new designs of varied articles, and leather plaiting could be carried on by the patient when he was discharged from

hospital and returned to his unit located in some areas like the Northern Territory, where tedium and boredom were prevalent. The improvised work-bench was encouraged to utilize resources at hand (for instance, in North Queensland the lawyer vine was used for all types and sizes of baskets, and in New Guinea pearl shell or scrap duralumin was employed); this was preferable to the sending forward of quantities of scarce and expensive fancy materials, which would be out of reach of the patient when he was discharged.

The popularity of this scheme created difficulties, and it had to be controlled by being confined largely to men referred by medical officers or ward sisters. Many stories have been told of how patients have been working hard on some activity, yet the handcraft worker or field hospital officer has not known how to do the work herself. One patient could teach string knotting to a group, and gradually this would spread from ward to ward until many were so occupied. It is certainly not handcraft ability that is the most important attribute of the Red Cross officer, but initiative to develop an idea where she sees it—an idea not always her own. Far more benefit may be gained by the patient who has not only employed himself, but also is thinking of others. It was proved time and again that simply distributing materials was of little value. The advice and comment that went with the first job enabled the patient completing another to say: "I never thought I could do this."

The value of this stimulus to a bored patient's interest needs little emphasis and it is a service that needs for its application women, well trained and well selected, able to fit into the hospital atmosphere, and ready to follow medical guidance in achieving more rapid recovery for the patient. It is a service for which medical and nursing staffs, immersed in their all-absorbing duties, have not the time. There is no doubt that, carried out in the efficient way that characterized it, this service left a lasting impression on the men and women who were laid aside in service hospitals during the war.

The society employed 80 full-time handcraft workers and 363 part-time voluntary assistants in Australia. These figures do not include those hospital visitors or field hospital officers in charge of handcrafts in both divisional and forward areas, of whom there were more than 50 carrying out this service wherever hospitals were set up.

Psychiatric Problems.

Probably in no other war have the psychiatric problems of members of the armed forces received so much real attention from the battlefield to the period of return to civilian existence. Much has been written on this subject, some of it of first-class importance, some of it based on misconceptions and ignorance.

Early in the war some public concern was expressed at the apparent lack of treatment facilities in Australia for this class of patient, and the society was approached to do something about it. As a result the council offered the Director-General Medical Services any assistance in its power of which he might care to make use. One of the first results of this offer was the appointment by the Victorian Division of a trained psychiatric social worker at the Heidelberg Military Hospital. The appointment of a psychiatric sub-committee—Lieutenant-Colonel H. Maudsley and Major John Williams—was made to the National Medical Services Committee, whose advice and guidance were constantly sought and freely given. A Red Cross convalescent home at Kew, Victoria, with a bed capacity of 100, was set aside to accommodate patients referred from the psychiatric wards at Heidelberg, the society furnishing the home with every facility needed for the rehabilitation of the patients. The home "Rockingham" achieved successful results under skilled medical supervision.

TRANSPORT.

In some countries transport of wounded is mainly, sometimes entirely, a responsibility of the Red Cross organization, a notable example being the United Kingdom,

where a large fleet of ambulances is maintained by the Red Cross Society under military direction. The Australian society laid its plans to render this service if this country was invaded. It was known that at least up to July, 1938, the army had only two ambulances, apart from some horse-drawn vehicles of ancient type, while the navy had one ambulance and part use of another. It was soon obvious that the society would not be expected to provide an ambulance service, and early in 1940 it was decided to present ambulances as gifts to the various medical services. Altogether 200 were presented through this Red Cross channel, many of them being shipped to the Middle East, where they were subsequently handed to the British Red Cross.

A considerable volume of transport service was rendered, however, in all States, in meeting convoys of wounded, sick and prisoners of war arriving by ship, aeroplane or ambulance train. Amenities not otherwise available were also placed on air ambulances at each landing place, while every hospital ship and ambulance train was accompanied by Red Cross representatives attached to the medical units in charge.

MEDICAL CONTROL OF RED CROSS SERVICE TO PRISONERS OF WAR.

The most widely known service rendered by the Red Cross Society in the late war was the provision of food parcels, invalid foods and medical supplies for prisoners of war. Where this help was able to be given fully, it was a valuable aid in maintaining health and morale and sometimes even life itself. The story gives point to the status of the Red Cross Society and the neutral International Red Cross Committee. The Prisoners of War Code, formulated by the International Red Cross Committee, and signed and ratified by most countries in 1929, has little reference to the Red Cross, whose only duty under the code is to establish an information bureau. There is a reference to undefined Red Cross welfare work, which must not be impeded, but the responsibility for caring for the basic needs of prisoners of war is placed on the captor nation, supervised by so-called "protecting powers".

British and American authorities fully carried out the obligations imposed on them in the care of enemy prisoners of war, but unfortunately, Germany, Italy, Japan and their allies failed to do so. Hence the vital need for Red Cross aid. Germany, and to a lesser extent Italy, permitted this aid to be given to a surprising extent, and it was carried out largely on a cooperative basis, by national Red Cross organizations, through the International Red Cross Committee. Shipping difficulties, distance and danger from enemy action were factors which caused the Australian Red Cross Society to pay to have food parcels packed by the Canadian Red Cross and to purchase other assistance from the British organization.

The least known aspect of this vital service is the close and expert medical supervision of the contents of the standard food parcels supplied by the Red Cross Society. This work was done by medical officers of the British War Office. Similar analyses were made in Canada and in the United States, and the procedure was closely followed by our own medical department. The nutritive value of the main basic commodities and their alternatives were estimated in terms of Calories, protein, calcium, iron, vitamins A, B and C, riboflavin and nicotinic acid. Calculations were made of the nutritive value of foods in each standard parcel, and the average value of each parcel was arrived at. From this was calculated the average value per week and per day. On figures supplied by the War Office the standard German and Italian prisoners of war ration was analysed. The figures obtained, added to those obtained from the analysis of standard food parcels, gave the available food values per man per day, which were compared with optimum requirements. From these calculations shortages in various constituents were estimated as well as some excess values. It was possible to control by this means the amount of fortification necessary in various food commodities. Similar

analyses of Japanese rations were made by the Ministry of Food, based on data supplied by the International Red Cross delegates. Compared with optimum requirements, there were, as might be expected, considerable deficiencies.

Immediately on the outbreak of war with Japan the Medical Service Committee of the Australian Red Cross Society, in anticipation of the capture of Australians, and in the false belief that the Japanese would permit the Red Cross service to operate as in Europe, devised a food parcel having regard to the basic national foods of Japan. This parcel was later accepted with slight modifications by the medical officers of the British War Office. The small amount of relief permitted subsequently by Japan is too well known.

Similar medical advice controlled the contents of invalid food parcels, which were accompanied by detailed directions as to their appropriate use. Medical and surgical equipment, drugs, dressings and special appliances not provided in sufficient quantities or variety by captor countries were dispatched through the International Red Cross Committee, largely on requisition sent by medical officers in prisoner-of-war camps.

Blinded prisoners were provided with appropriate equipment and instruction on the lines adopted at Saint Dunstan's Hospital, while a similar service was rendered to those who had become deaf. Textbooks were sent to medical officers, while the education service provided had definite medical value in prison camps.

The excellent results obtained in the maintenance of health amongst prisoners of war in Europe where Red Cross aid was available can be largely attributed to the close association of the medical profession in this service.

Although the Japanese authorities at the outset announced that they would observe the Geneva Convention, no such regular service was ever permitted. Large quantities of food parcels and medical supplies were prepared under close medical supervision, but very little of this ever reached the prison camps.

EDUCATION IN NUTRITION.

When, in 1942, food rationing was commenced in this country, the society felt that it should assist in order that the best use should be made of the more limited food supplies. Although Australia was never really short of food, there has always been too much malnutrition.

It had been urged by the National Health and Medical Research Council that a widespread national campaign should be initiated to ensure a complete and adequate supervision over the diet of the community, and that this provided important work for the Women's organizations throughout Australia. From every survey made it has been shown that varying degrees of malnutrition exist in Australia and that much ill health, both physical and mental, is due to the inadequacy of our diet. Bad dietary habits may be the result of economic hardship; but a great deal of the blame can be attributed to ignorance on the part of many persons as to food needs and food values.

The Nutrition Service of the Australian Red Cross Society was therefore inaugurated to assist the Commonwealth Government in the task of disseminating knowledge of the principles of nutrition to the Australian people. In an effort to educate men, women and children as to what constitutes a "balanced diet", the Australian Red Cross Society arranged for nutrition campaigns to be conducted in the various States of the Commonwealth. This work was commenced more than eighteen months ago, and since then the society has slowly enlarged its sphere of activities to meet the needs of the Australian community.

A Red Cross National Nutrition Committee was formed within the medical department. It included medical specialists and trained dietitians, nominated by their professional organization. Two trained dietitians were appointed to the staff at national headquarters. As they work in cooperation with the Commonwealth Department of Health and the State Nutrition Committee, their activities are confined to those spheres not being adequately dealt with by other authorities.

Elementary nutrition courses have been conducted in cities and in many country towns. To these, members of the public, Red Cross personnel and representatives from different women's organizations are invited. In addition, the dietitians visit schools, teachers' colleges, parents' associations, women's organizations and youth clubs, giving single talks on nutrition. Pamphlets, posters, charts and strip films have been prepared to assist the programme, and efforts are being made to arouse interest in nutrition problems affecting the health and welfare of the Australian people. For those unable to attend lectures, broadcast talks have been arranged, and from time to time articles are published in the city and country Press dealing with "food facts" with which all should be familiar.

Through these activities it has been possible to make contact with a large section of the public. However, the work is only in its infancy at present; but it is hoped to extend it considerably in the near future, as it is thought that by doing so the Red Cross will be performing a valuable service, particularly in the post-war years.

EDUCATION IN HOME MANAGEMENT.

The society has also sponsored a course of lectures in home management, as it is considered that the greatest contribution women can make to the peace and happiness of the post-war world is to foster the art of home-making. The primary object of the course is to stimulate the wives and relatives of returning men to prepare themselves to become better housewives and home-makers, so that the best possible conditions will be available for their menfolk after their long absence. Through the willing cooperation and help of the domestic science schools in Victoria, a series of ten lectures and demonstrations has been given in Melbourne and some country areas. The subjects dealt with have included cookery, laundry work, housewifery, budgeting, marketing and nutrition. It is hoped shortly to establish this project in New South Wales and Queensland and to enlarge upon it so as to include various other subjects which will prove useful to all home-makers, both men and women.

An interesting phase of this campaign of education has been the experiment being conducted at the Royal Melbourne Hospital by the Victorian Division on the suggestion of Dr. Ivan Maxwell. A qualified dietitian has been installed in quarters provided by the board of management, solely to give instruction in home food management to patients and their friends referred by medical and other officers. This dietitian has no relation to the dietetic treatment prescribed for patients.

OTHER ACTIVITIES.

Other activities were carried on during the war and are still being conducted. The limits of time and space debar more than a brief mention of some of them, and as the Chairman of the American Red Cross recently remarked, "medical and health problems touch virtually every aspect of Red Cross activities". The Red Cross Society is a permanent organization and two points form its basic principles—succour for all victims of war without distinction, and the struggle against human suffering in all its forms.

The service has been available to all civilian sufferers from the war—to merchant seamen, civilian internees, people evacuated to this country from enemy-occupied territories, and the inhabitants of devastated countries in Europe and Asia. While medical supplies, clothing, food and other commodities and financial aid were sent to the United Kingdom and on the Continent to France, Norway, Poland, Yugo-Slavia, Czechoslovakia, Russia and Albania, special aid was rendered to Greece and Crete and to countries liberated from the Japanese. Large relief shipments and specialist teams of relief workers were sent to the people of Greece, in recognition, not only of their great need, but of their kindness to Australian soldiers.

For the relief of liberated prisoners of war and internees in Asiatic and Pacific territories, many tons of relief goods have been sent. A relief ship was chartered and loaded

with 4,500 tons of goods; it resembled a floating warehouse. These were the first supplies available in these areas other than the Philippines, and at the present moment the society's workers are distributing them in Singapore, Saigon, Hong-Kong, Shanghai and Borneo and in Australian territories.

Medical supplies have been sent to China, and requests are coming in even now—each day almost—for more and more aid, especially in Dutch islands and in French Indo-China.

Civilian needs within Australia during the war absorbed much of the society's attention. Disasters such as bush-fires and epidemics, shortage of nursing staffs in hospitals, and assistance in tuberculosis clinics, in promoting mass radiography and in immunization schemes, have taxed the available service to the utmost, as did the now almost forgotten civil defence measures when invasion threatened this country.

Conclusion.

A sincere tribute is offered to the hundreds of thousands of Australians, mainly women, who by their sacrifice and work, mostly given anonymously, carried on so vigorously this vast constructive and practical organization of sympathy and aid to those who suffered during the war.

Although peace of a sort has come to this earth, much work in the field of social service remains yet to be done. The Red Cross is the name and emblem of a great labour of love and mutual aid, in which all nations have been brought together. It embodies the idea of brotherly help, systematic, truly neutral, remote from national, religious and social differences, voluntarily enlisted in the struggle against human suffering. It is inconceivable that such a united will to help in all times of need should be permitted to disintegrate because fighting has ceased. Recently a soldier wrote: "May the Red Cross go on for ever." It will so long as humanity needs it. The universal application of its spirit throughout the world surely would do more for permanent peace than the political systems. But Dr. Huber, the great President of the International Red Cross, has said:

To see in the pacification of the world by the rule of justice the supreme goal of all politics and to work towards that goal with energy and confidence, does not mean that we should shut our eyes to the fact that recourse to violence has not yet been made impossible, human instincts being what they are, demoniac and nature bound still. This being so, we must still stand ready to help when the need arises so that in the midst of awful havoc, the Red Cross on the white field may continue to bear aloft the symbol of fraternity.

The Australian Red Cross Society will carry on and will value the continued and extending assistance of the medical profession.

ACQUIRED RESISTANCE OF STAPHYLOCOCCI TO THE ACTION OF PENICILLIN.

By E. A. NORTH and R. CHRISTIE,

From the Commonwealth Serum Laboratories, Melbourne.

SPINK, Hall and Ferris (1945) failed to find a strain of staphylococcus not previously exposed to penicillin that was not inhibited by one unit of penicillin per millilitre, although more than 100 strains were tested. This is in accord with our own findings (North and Christie, 1945), that whilst naturally occurring penicillin-resistant staphylococci are at the most rare, a large proportion of the strains isolated from wounds in patients undergoing prolonged penicillin treatment showed considerable resistance as judged by standard sensitivity tests. There was, however, no definite evidence to indicate whether the resistant strains were the direct descendants of sensitive organisms

TABLE I.
Characteristics of *Staphylococci* Isolated from Leg Wound of Patient W33.

Date Isolated.	Serial Number of Strain.	Coagulase Formation.	Fibrinolysis.	Hæmolysis. ¹	Pigment Formation. ²	Mannitol Fermentation. ³	Serological Typing. ⁴	Penicillin Resistance. ⁵
7.6.45	S948	+	+	α	Aureus +++++	+1	III-VI	0.6 unit
15.6.45	S962	+	+	α	Aureus +++++	+1	III-VI	2.5 units
21.6.45	S988	+	+	α	Aureus +++++	+1	III-VI	10 units

¹ Hæmolysis is recorded as observed on 5% sheep blood agar.

² Pigment is graded with regard to intensity ("Aureus +++++" indicates intense pigment formation).

³ The "+" sign indicates fermentation, and the numeral the day on which fermentation is complete.

⁴ The Roman numerals indicate the type sera which cause agglutination.

⁵ Resistance is recorded as the highest concentration in units per millilitre of penicillin in broth in which growth is apparent (even if slight) after twenty-four hours.

already in the wounds or were the result of cross-infection, either with naturally resistant strains or with odd strains that had acquired resistance and had become disseminated through the wards.

In the course of further work (to be published) some penicillin-resistant staphylococci were encountered which with little reasonable doubt could be regarded as variants of sensitive parent organisms, which had developed their resistance to penicillin *in vivo*. The finding of such variants enabled us to compare the reactions, particularly in laboratory animals, of the variants which had developed resistance to penicillin *in vivo* with variants which had acquired resistance *in vitro*.

The observations recorded in this communication confirm the general conclusions reached by Spink, Hall and Ferris (1945) with regard to the difference between variants whose resistance has been developed *in vivo* and variants whose resistance has been developed *in vitro*. They also show that the former retain full pathogenicity as judged by animal experiments, and that the penicillin resistance demonstrated by tests *in vitro* can also be shown in tests in laboratory animals—that is, *in vivo*.

Materials and Methods.

Penicillin-Resistant Variants of Normally Sensitive Strain Developed *in Vivo*.

Three cultures, S948, S962 and S988, were isolated on the dates shown in Table I. This table also shows their various biological and metabolic characteristics. Serological typing was done by slide agglutination (Christie and Keogh, 1940), whilst tests for penicillin resistance were carried out as previously described (North and Christie, 1945). S962 and S988 are regarded as true penicillin-resistant variants of S948.

In the animal experiments to be described, the reactions of S988 were compared with those of S948.

Penicillin-Resistant Variants of Standard Sensitive Strain F.D.A. 209, Developed *in Vitro*.

Penicillin-resistant variants of standard sensitive strain F.D.A. 209 were developed *in vitro* by daily subculturing of strain F.D.A. 209 in increasing concentrations of penicillin in nutrient broth. As the strain developed increasing resistance, agar slopes were inoculated from the tube containing the highest concentration of penicillin in which growth occurred. Such cultures were preserved under paraffin for future reference and testing, and were designated F.D.A. 209/1, F.D.A. 209/10, and so on, up to F.D.A. 209/160, the denominator indicating the highest unitage of penicillin per millilitre of broth in which the variant would grow.

Mouse Pathogenicity Tests.

Mouse pathogenicity tests were carried out as previously described (North and Christie, 1945), except that a range of dosages was employed to find the actual killing effect of the strains compared. The dose was always made up to a volume of one millilitre with normal saline solution, and its strength was estimated by the use of Burroughs Wellcome standard opacity tubes.

Comparison of Results of Penicillin Therapy in Staphylococcal Infections in Mice with Sensitive (S948) and Resistant (S988) Strains.

The infecting dose was that used in our standard mouse pathogenicity test (4,000,000,000 organisms), and the penicillin dosage was based on the report of Warner and Amluxen (1945), in which they found that it was necessary to give 200 units per gramme of body weight every one and a half hours to maintain a concentration of one unit per millilitre. Further details will be given when the actual experiment is being described.

Standard Biochemical Tests.

Tests for coagulase production, fibrinolysis, hæmolysis, pigment formation and penicillin sensitivity were carried out as described previously (North and Christie, 1945; Christie, North and Parkin, 1945).

Results.

Comparison of the pathogenicity for mice of strains S948 (penicillin-sensitive) and S988 (penicillin-resistant) shows (Table II) that their killing power is identical within the limits of experimental error. Further reference to Table I shows that this similarity is combined with only one observable difference—resistance to penicillin as tested *in vitro*.

TABLE II.
Effect on Mice of Living Cultures of Penicillin-Sensitive *Staphylococcus*, S948, and of Penicillin-Resistant Variant, S988.

Culture.	Number of Organisms (Millions).	Number of Mice.	Result After Twenty-four Hours. ¹
S948	4,000	5	+++++
S948	2,000	5	++++S
S948	1,000	5	+++S
S948	500	5	SSSSS
S988	4,000	5	+++++
S988	2,000	5	+++++
S988	1,000	5	+++SS
S988	500	5	SSSSS

¹ The symbol "+" indicates death; "S" indicates survival of mouse.

Once the fact was established that S948 and S988 were equally lethal for mice, the ability or otherwise of penicillin to prevent death in mice was investigated. Four groups of mice, A, B, C and D, each consisting of ten animals of equal weight (20 grammes), were used. Groups A and C were left untreated, whilst the mice of groups B and D were given 4,000 units of penicillin intraperitoneally at 8.45 a.m. and again at 10.15 a.m. Mice of groups A and B were then infected with S948 organisms intraperitoneally, and mice of groups C and D with S988 organisms (penicillin-resistant variants). The order of infecting the mice was such that the penicillin-treated animals received the living staphylococci fifteen to twenty minutes after the second dose of penicillin. The mice in groups B and D received a further 17,000 units spread over three doses at intervals of three hours, the first dose being given one hour after the infection with staphylococci.

TABLE III.
Demonstration of Penicillin Resistance in Staphylococci by Mouse Inoculation.

Group of Mice.	Strain of Infecting Staphylococci.	Penicillin Resistance in Vitro.	Number of Organisms (Millions.)	Total Units of Penicillin Administered.	Number of Mice.	Result. ¹
A	S948	0.6 unit ²	4,000	Nil	10	+++++
B	S948	0.6 unit	4,000	25,000	10	SSSSSSSSSS
C	S988	10 units	4,000	Nil	10	+++++
D	S988	10 units	4,000	25,000	10	+++++

¹ The result was read twenty-four hours after the mice were infected intraperitoneally, and seventeen hours after groups B and D had their final dose of penicillin. The symbol "+" indicates death; "S" indicates survival of mouse.

² The standard penicillin-sensitive strain F.D.A. 209 used as a control when resistance was being estimated *in vitro* gave the same result as S948.

The penicillin solution used contained 25,000 units per millilitre, and each mouse treated received one millilitre in divided doses.

The result of this experiment (Table III) is similar to that of one recorded by Warmer and Amluxen (1945), in that penicillin saved the mice infected with a penicillin-sensitive strain, whilst similar treatment failed to protect mice against infection with a penicillin-resistant staphylococcus. Our experiment is of added interest, since the resistant staphylococcus is almost certainly a direct descendant of the sensitive strain S948.

The penicillin-resistant variant F.D.A. 209/160, developed *in vitro*, was found to differ considerably from the parent strain F.D.A. 209 in its biological and metabolic characteristics. It grew poorly on nutrient agar and the colonies were smaller than the usual staphylococcal colonies. Little pigment was formed, and some β haemolysis was evident on sheep's blood and agar. Mannitol fermentation was only slightly slower, but the variant still produced coagulase, although not so rapidly as F.D.A. 209. On the other hand, in poorness of growth, reduced size of colonies and almost complete lack of opacity in colonies, it could not be said to resemble closely any strain—pathogen or non-pathogen—that we have isolated from living tissues.

On repeated subculture in nutrient broth of strain F.D.A./160, its characteristics reverted to those of the parent strain, including its sensitivity to penicillin. The same alteration in characteristics was shown by the less resistant variants F.D.A./1 and F.D.A./10. These changes did not run parallel with increased resistance to penicillin; they appeared to precede it.

The killing doses in mice of living cultures of F.D.A. 209 and its resistant variants, particularly F.D.A. 209/160, were investigated with the result shown in Table IV. It will be noticed that strain F.D.A. 209 kills within exactly

TABLE IV.
Fatal Dose for Mice of Living Culture of Standard Penicillin-Sensitive Strain F.D.A. 209 and of Three Variants with Resistance to Penicillin developed *in vitro*.

Culture.	Infecting Dose (Millions of Organisms.)	Number of Mice.	Result After Twenty-four Hours. ¹
F.D.A. 209 ²	3,000	5	+++++
F.D.A. 209	2,000	5	+++++
F.D.A. 209	1,000	5	+++++
F.D.A. 209	500	5	SSSSS
F.D.A. 209/160 ..	32,000	2	++
F.D.A. 209/160 ..	16,000	6	++SSSSS
F.D.A. 209/160 ..	8,000	7	SSSSSSSS
F.D.A. 209/160 ..	4,000	5	SSSSS
F.D.A. 209/10 ..	6,000	1	S
F.D.A. 209/10 ..	4,000	5	SSSSS
F.D.A. 209/1 ..	4,000	5	SSSSS

¹ For particulars of F.D.A. 209 and its variants, see text.

² Symbol "+" indicates death; "S" indicates survival of mouse.

the same range as S948 and S988 (see Tables II and IV), whilst F.D.A. 209/160 is almost completely avirulent. (Suspensions of killed organisms from non-pathogenic strains are lethal for mice in doses of 100,000,000,000.)

The killing power of strain F.D.A. 209/10 was not tested in a higher dosage than 6,000,000,000, as many non-pathogenic strains cause mice to appear ill with this dosage. After injection of organisms F.D.A. 209/10 the mice remained perfectly well.

A rabbit was injected intravenously with one millilitre of a twenty-four hour broth culture of F.D.A. 209/160. On the day following the injection the rabbit looked perfectly well. An attempt to recover the organism from the blood was successful, and the staphylococcus was found to be still resistant to 160 units of penicillin per millilitre. Further attempts at blood culture failed, and the rabbit suffered no apparent ill effects.

As a further check on the validity of the results obtained in mice, 0.5 millilitre of a twenty-four hour broth culture of F.D.A. 209 was injected intravenously into a rabbit, which died within twenty hours. Another rabbit similarly dosed with a culture of F.D.A. 209/10 remained perfectly well.

It has been shown that a penicillin inhibitor can be extracted from staphylococci that have acquired resistance *in vivo* (Spink, Hall and Ferris, 1945), but not from resistant variants developed *in vitro*. By two methods, both differing from that referred to by Spink *et alii*, we have confirmed this.

Selected strains were grown overnight in broth, and penicillin was added in graded amounts to quantities of 10 millilitres of the sterile filtrates. The tubes were then inoculated with the standard sensitive strain, F.D.A. 209, and reincubated. Growth occurred in the two filtrates from resistant strains developed *in vivo*, when the penicillin concentration was as high as 2.5 units per millilitre. With the filtrates from the standard sensitive strain itself and from a resistant variant (F.D.A. 209/160) developed *in vitro*, the highest concentration of penicillin in which growth occurred was 1/32 unit per millilitre.

Two resistant strains developed *in vivo* and one developed *in vitro* were "spot inoculated" on the centre of nutrient agar plates containing 2.5 units of penicillin per millilitre and incubated overnight. A streak inoculum of the standard sensitive strain (F.D.A. 209) was then made across the medium, passing close to each central colony. On further incubation growth from the streak inoculum of the sensitive strain occurred near the colonies of the resistant strains developed *in vivo*. No growth occurred near the colony of the resistant variant (F.D.A. 209/160) developed *in vitro*.

Discussion.

Spink, Ferris and Vivino (1944), stated that "probably of considerable clinical importance is that an increased resistance to penicillin is accompanied by the development of strains which are more susceptible to the bactericidal action of whole blood, and possibly to the other defence mechanisms of the host". This conclusion appears to have been based mainly on experiments conducted on resistant variants developed *in vitro*, and Spink and his associates (1945) have recently modified this view. They now consider that the resistance to penicillin which has been developed by *in vitro* methods is only a temporary characteristic of the organisms, whilst resistance acquired *in vivo* as a result of therapy with penicillin appears to be a more permanently acquired property. They state that

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the organisms which have become resistant to penicillin in the human body are as resistant to the bactericidal action of human blood as the penicillin-sensitive parent strains—in other words, they retain their full pathogenicity.

Our results tend to confirm the later views of Spink and his associates, especially with regard to the invasiveness of the strains which have developed resistance in the human body. In our experience it has not been easy to trace the direct development of resistance in a strain in infected war wounds. However, there is little room for doubt in the instance recorded by us, as strains serologically resembling S948, S962 and S988 are uncommon.

So far there is little evidence that these resistant strains developed *in vivo* have been a major cause of failures with penicillin. However, Anderson, Howard and Rammelkamp (1944), reporting on the penicillin treatment of a series of patients suffering from chronic osteomyelitis, tested the sensitivity of the organisms before therapy; at intervals the organisms which persisted in the lesions were tested again. In two cases cultural examinations made a year after completion of penicillin therapy showed the organisms to be still resistant to penicillin.

Six resistant strains isolated from infected wounds treated with penicillin have been subcultured in this laboratory every day in nutrient broth for a period of thirty days. At the end of that time they showed the same resistance to penicillin as at the beginning, and they also showed all their former properties indicating full pathogenicity and invasiveness. One of these strains was three times subjected to animal passage, being given intravenously to a rabbit and recovered *post mortem*; after the third passage its resistance to penicillin as tested *in vitro* had not altered.

Warner and Amluxen (1945), in experiments (already referred to) using mice, found that a penicillin-resistant hemolytic staphylococcus proved to be resistant to concentrations of penicillin *in vivo* comparable with those *in vitro*. The strain which was isolated from an abscess following osteomyelitis treated with penicillin was found by laboratory tests to be resistant to concentrations of penicillin below 10 units per millilitre. The experiment (see Table III) carried out by us, and based on Warner and Amluxen's report, completely confirmed their findings.

Evidence such as that contained in the reports of Spink *et alii* (1945), Anderson *et alii* (1944), Warner and Amluxen (1945), together with our own experience, suggests that penicillin-resistant staphylococci may become a clinical problem of the future.

Conclusions.

1. Penicillin-resistant staphylococci developed *in vivo* are as highly pathogenic for laboratory animals as the sensitive parent organisms.
2. Resistant variants developed *in vitro* are not pathogenic for laboratory animals.
3. Staphylococci in which resistance has been developed in the human body following penicillin treatment kill mice in spite of the administration of large amounts of penicillin.

Bibliography.

- D. G. Anderson, L. G. Howard and C. H. Rammelkamp: "Penicillin in the Treatment of Chronic Osteomyelitis. Report of 40 Cases", *Archives of Surgery*, Volume XLIX, October, 1944, page 245.
- R. Christie and E. V. Keogh: "Physiological and Serological Characteristics of Staphylococci of Human Origin", *The Journal of Pathology and Bacteriology*, Volume LI, 1940, page 189.
- R. Christie, E. A. North and B. J. Parkin: "Criteria of Pathogenicity in Staphylococci", 1945 (to be published).
- E. A. North and R. Christie: "Observations on Sensitivity of Staphylococci to Penicillin", *The Medical Journal of Australia*, Volume II, July 14, 1945, page 44.
- W. W. Spink, U. Ferris and J. J. Vivino: "Antibacterial Effect of Whole Blood upon Strains of Staphylococci Sensitive and Resistant to Penicillin", *Proceedings of the Society of Experimental Biology and Medicine*, Volume LV, 1944, page 210.
- W. W. Spink, W. H. Hall and U. Ferris: "Clinical Significance of Staphylococci with Natural or Acquired Resistance to the Sulphonamides and to Penicillin", *The Journal of the American Medical Association*, Volume CXXVII, June 23, 1945, page 555.
- H. Warner and J. Amluxen: "Comparison of *In Vitro* and *In Vivo* Penicillin Resistance of a Strain of Hemolytic Staphylococcus Aureus", *The Journal of Laboratory and Clinical Medicine*, Volume XXX, May, 1945, page 419.

PLEUROPNEUMONIA-LIKE ORGANISMS IN CASES OF NON-GONOCOCCAL URETHRITIS IN MAN AND IN NORMAL FEMALE GENITALIA.

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DURING the present war, about half of the cases of urethritis among men in the Australian armed services have been non-gonococcal. Most of these cases of so-called non-specific urethritis conform to the following fairly well-defined disease entity: the discharge is usually serous or milky and small in amount, little or no pain occurs on urination, there is no definite response to penicillin or sulphonamides, and in smears are found polymorphonuclear and epithelial cells. There is always a history of venereal contact, the incubation period being between seven and twenty-one days in two-thirds of our cases.

Complement Fixation Tests.

In 1940 Dienes reported the isolation of pleuropneumonia-like organisms from the cervix of five women, and later he and Smith (1942) isolated these organisms from 23 of 77 cervical swabs from women and from four men suffering from prostatitis. Klieneberger-Nobel (1945) cultivated pleuropneumonia-like organisms from the vagina of from 14% to 40% of women, some of whom were suffering from venereal disease and some of whom were apparently normal.

In 1943, Beveridge, seeking the cause of non-specific urethritis, isolated pleuropneumonia-like organisms from four of twenty-four patients. This led Dr. A. Neave Kingsbury (personal communication) to carry out complement fixation tests with serum from patients with venereal disease, using antigen prepared by one of us (A.D.C.) from the bovine pleuropneumonia organism. Kingsbury obtained a number of positive reactions, but there was no clear association between the results of the tests and the patient's clinical condition. We had a similar experience using antigen prepared from the bovine organism.

Antigen for complement fixation tests was prepared from two strains of pleuropneumonia-like organisms isolated from patients suffering from non-specific urethritis. The technique of the tests and the preparation of the antigen were as used for bovine contagious pleuropneumonia (Campbell and Turner, 1936; Campbell, 1938). In the first few batches of serum there was a striking correlation between the results of the tests and the clinical condition; of 62 specimens of serum from patients suffering from non-specific urethritis in New South Wales, 57 gave positive results, whereas only seven positive results were obtained from 98 specimens of serum from normal blood donors in Melbourne. However, subsequently only 22 positive results were obtained with 66 specimens of serum from patients suffering from non-specific urethritis in Victoria, and 44 positive results were obtained among 158 specimens of serum sent in for Wassermann testing. The majority of the last-mentioned subjects presumably were not suffering from non-specific urethritis.

Cultural Investigations.

Since publication of the earlier series of cultural studies by Beveridge mentioned above, Johnston and McEwin (1945) isolated two strains from cases of non-specific urethritis in South Australia. Urethral smears from each of these patients contained cytoplasmic inclusions, which these authors suggested might be manifestations of either the pleuropneumonia-like organism or a virus. Dr. S. E. Williams (personal communication) has observed similar inclusions in smears from patients suffering from non-specific urethritis. He also saw extracellular forms, and considered that those inside and outside the cells were pleuropneumonia-like organisms, as they closely resembled such organisms seen in smears from mouse lung.

We have recently culturally examined 70 urethral washings from patients suffering from non-specific urethritis by means of the semi-solid medium previously described (Beveridge, 1943), with the modification that only one tube was sown with each specimen and penicillin was added to a concentration of about 20 units per millilitre. Pleuropneumonia-like organisms were isolated from 14, and in most of these instances they were present in large numbers in the primary culture. Attempts at culture of the organisms from 67 normal male medical students yielded no positive results. Dr. Ella Macknight cooperated in the investigation by examining 11 women from whom men had contracted the disease. These women all had some erosion of the cervix, usually of mild degree. Cultures of pleuropneumonia-like organisms were obtained from three of 11 swabs from the cervix of these women. Dr. Macknight also collected swabs from the cervix and vulva of 101 apparently normal women attending the gynaecological clinic of a public hospital. Positive cultures were obtained from 17 of these women. In three instances the organisms were grown from the vulva and not from the cervix, in two from the cervix and not from the vulva, and in seven from both; in the remaining five instances the region was unspecified. There were no obvious cultural differences between the strains from the normal women and those from women suffering from non-specific urethritis.

Investigation of Respiratory Infections.

Since there was such poor correlation between the results of the serological tests and the clinical condition of the genital tract, investigations were undertaken in an attempt to trace the origin of the positive serological reactions.

Eighteen specimens of serum from 72 patients suffering from febrile upper respiratory tract infections gave positive results to complement fixation tests against antigen made from pleuropneumonia-like organisms isolated from patients suffering from urethritis. In ten instances serum taken at the time of infection gave negative results, while that obtained from the same person during convalescence gave a positive response to complement fixation tests. However, in four instances the reverse occurred.

Seventeen specimens of serum from 24 patients with atypical pneumonia yielded positive results.

Attempts were made to grow pleuropneumonia-like organisms from material from four patients suffering from atypical pneumonia, from 57 washings from infected antra, and from 70 excised tonsils. No cultures were obtained.

Discussion.

The results of both cultural and serological studies have failed to clarify the significance of pleuropneumonia-like organisms in non-specific urethritis as seen in Australian servicemen.

For the present we must leave out of consideration the results of the complement fixation tests, which are confusing. The positive reactions may be non-specific or may be due to infection with pleuropneumonia-like organisms in some part of the body other than the urethra.

The main objections to the hypothesis that non-specific urethritis is principally or wholly due to infection with pleuropneumonia-like organisms are (i) the failure to obtain a growth of the organisms in 80% of cases and (ii) their presence in about 20% of normal women.

1. It was not possible, in the circumstances in which the work was done, to make repeated attempts at culture from the same subject. Pleuropneumonia-like organisms are relatively delicate, and it is easy to imagine circumstances in which they might fail to appear in culture although they were primarily responsible for the clinical condition. Such factors might account, at least to some extent, for the rather small proportion of positive results we obtained.

2. The existence of pleuropneumonia-like organisms in the genital tract of a considerable proportion of women showing no clinical evidence of infection cannot be regarded as evidence against the view that this group of organisms is responsible for non-specific urethritis in the male. It would be in line with general concepts of the

ecology of bacteria of low potential pathogenicity—for example, pneumococci and meningococci in the throat—to find such a state of affairs. Non-specific urethritis in the male is often, perhaps usually, so trivial that it would be likely to escape attention in civil life.

Certainly no conclusion is justified on the present evidence; but all the facts available are nevertheless consistent with the tentative hypothesis that the disease is, in the majority of cases, the result of infection by pleuropneumonia-like organisms.

Summary.

Complement fixation tests against pleuropneumonia-like organisms isolated from urethritis produced positive reactions with a proportion of specimens of serum from persons suffering from various complaints, but there was no clear correlation with any clinical condition. These organisms were isolated in 20% of cases of non-specific urethritis among males and from 17% of swabs from the genital tract of normal women. None were detected in normal men. The interpretation of these results is discussed.

Acknowledgements.

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Bibliography.

- W. I. B. Beveridge: "Isolation of Pleuropneumonia-Like Organisms from the Male Urethra", *THE MEDICAL JOURNAL OF AUSTRALIA*, Volume II, 1943, page 279.
- A. D. Campbell: "Contagious Bovine Pleuropneumonia: A Report on the Use of New Antigens for the Complement-Fixation and Agglutination Tests", *The Journal of the Council for Scientific and Industrial Research*, Volume II, 1938, page 112.
- A. D. Campbell and A. W. Turner: "Studies on Contagious Pleuropneumonia of Cattle: II. A Complement Fixation Reaction for the Diagnosis of Contagious Bovine Pleuropneumonia", *Council for Scientific and Industrial Research, Australia*, Bulletin Number 97, 1936, page 11.
- L. Dienes: "Cultivation of Pleuropneumonia-Like Organisms from Female Genital Organs", *Proceedings of the Society for Experimental Biology and Medicine*, Volume XLIV, 1940, page 468.
- L. Dienes and W. E. Smith: "Relationship of Pleuropneumonia-Like Organisms to Infections of the Human Genital Tract", *Proceedings of the Society for Experimental Biology and Medicine*, Volume L, 1942, page 39.
- G. A. W. Johnston and J. McEwin: "Non-Gonococcal Urethritis: Considerations of Aetiology; Findings in Two Cases", *THE MEDICAL JOURNAL OF AUSTRALIA*, Volume I, 1945, page 369.
- E. Kileneberger-Nobel: "Pleuropneumonia-Like Organisms in the Human Vagina", *The Lancet*, Volume II, July 14, 1945, page 46.

EARLY RESULTS IN A SHORT SERIES OF CASES OF GUNSHOT WOUNDS OF THE ABDOMEN.

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It is the purpose of this communication to present the early results in 27 cases of gunshot wounds of the abdomen sustained in a recent campaign in the South-West Pacific Area. These patients were treated in a forward surgical unit attached to a field ambulance, the time lag between receipt of the wound and operation averaging eight hours (varying from four to sixteen hours). Rifle bullets were the cause of the wound in eight instances, machine-gun bullets in three, fragments of mortar bombs in six, frag-

ments of high explosives in five, fragments of grenades in three and fragments of landmines in two.

Eighteen patients had bowel perforations, whereas nine had involvement of solid viscera only—seven had involvement of the liver, and one had involvement of the spleen and one of the kidney. There were two abdomino-thoracic wounds in the former group—one on the right side involving the liver, duodenum and jejunum, and one on the left involving the descending colon—and three in the latter group, two involving the liver and one the spleen. The abdominal lesion was the major in these cases, the chest injury being simply a perforation of the lower lobe of the lung associated with a hæmopneumothorax. In one instance the chest wound was sucking in character.

Seven patients had associated wounds, four having multiple wounds of the extremities, one a sucking chest wound, one a pulmonary and abdominal blast effect, and one a penetrating brain wound.

RESUSCITATION.

Blood loss is the predominating feature in abdominal wounds, because of the extensive hæmorrhage into the peritoneal cavity and into the mesenteric and retroperitoneal tissues, apart from that due to any associated injuries. The subsequent circulatory deficiency causes anoxia of vital organs, which rapidly leads to an irreversible state of decompensated shock⁽⁴⁾ unless early and rapid transfusions of blood are given.

Replacement therapy with stored or fresh group O blood was accordingly commenced immediately on the patient's arrival, whether he appeared to require it or not. Each patient received an average of four litres, usually two before, one during and one immediately after operation. Since the best results are achieved by rapid transfusions of whole blood and by early operation, the first two litres were given at the rate of fifteen minutes each or even faster if this was considered necessary. Ogilvie⁽⁵⁾ points out that there is no limit to the amount or rate of transfusions in cases of severe blood loss, and in this series no untoward effects were seen from this quick, massive form of transfusion.

As a consequence, those patients who required abdominal exploration were fit for operation on an average one hour after the commencement of resuscitation. However, one patient with extensive abdominal injuries, who appeared to be adequately resuscitated with three litres of blood, died during operation eight hours after receipt of the wound, and another with a badly shattered liver died six hours after receipt of the wound whilst being resuscitated.

DIAGNOSIS AND OPERATIVE TECHNIQUE.

Diagnosis and operative technique have been discussed in numerous articles, more especially by Gordon Gordon-Taylor and W. H. Ogilvie, and do not need recapitulation here.

Twenty-three patients, including three with abdomino-thoracic wounds, required abdominal exploration, whilst two with simple perforating abdomino-thoracic wounds involving the liver and lung and one with a perforating wound of the left kidney responded to conservative measures. The chest lesions in the cases of abdomino-thoracic wound required only suture of a sucking wound in one case and repeated aspiration of a hæmothorax with penicillin instillation in four cases. These last patients had an expanded lung and a dry pleural cavity within ten days.

Tetanus toxoid and gas-gangrene antiserum were given to all patients.

AFTER-TREATMENT.

All patients who required operation had the stomach drained by a Ryle's tube until peristalsis was audible, usually on about the fourth day. During this time a daily amount of four litres of fluid, mostly serum to help supply protein, was given intravenously to ensure a daily excretion of 1,200 to 1,500 millilitres of urine and to make up loss of

fluid by sweating. Once the Ryle's tube was removed, intravenous infusions gave place to feeding by mouth.

Blood hæmoglobin estimations and red cell counts were performed every third day, and if the level of hæmoglobin fell below 80%, further transfusions were given to correct the anæmia.

PENICILLIN.

Penicillin is most valuable in gunshot wounds of the abdomen.⁽⁶⁾ Its purpose is twofold—firstly to prevent or localize infection in the parietes and any associated wounds, and secondly, to prevent or localize peritonitis, as it is now known that streptococci and staphylococci are contaminants of the peritoneum in these cases.⁽⁷⁾

Intramuscular penicillin therapy was commenced immediately on the patient's arrival, amounts of 15,000 units being given every three hours. The average amount given was 720,000 units, though it was much higher when other injuries were present.

Penicillin, in the form of penicillin-sulphanilamide powder, was used locally in the abdominal wall and associated wounds, but it was not used in the peritoneal cavity.

CONVALESCENCE.

All patients held in the forward unit were fit for evacuation usually two or three weeks after operation. Evacuation was by a sea trip of sixty miles, and as it was noticed that "abdominal" patients were liable to seasickness, this trip was always postponed if the seas were rough. A sudden storm at sea made one patient seasick, and as a result he almost died from an attack of acute confusional insanity lasting fourteen days.

RESULTS.

Eight of the nine patients with solid viscera injuries only recovered, and nine of the eighteen patients with bowel perforation recovered. Four of the five patients with abdomino-thoracic wounds included in the above figures survived.

Recoveries.

The patients who recovered are divided into two groups, (i) those with solid viscera injuries only and (ii) those with bowel perforations.

Solid Viscera Injuries Only (Eight Cases).

Six patients had an uneventful convalescence. Three of these had sustained perforating abdomino-thoracic wounds, two on the right side with liver perforations which did not require operation, and one on the left with a ruptured spleen requiring splenectomy. In two cases, a large foreign body lodged superficially in the liver and was removed at operation; one of these patients had a sucking chest wound in addition. One patient had a perforating wound of the left kidney which did not require operation. An excretion pyelogram three weeks later revealed a normal kidney.

Two patients had post-operative complications. One, who had a large foreign body removed from the liver, developed a superficial wound infection due to a penicillin-sensitive *Staphylococcus aureus* and *Bacillus proteus*; this rapidly yielded to treatment. The other had a badly damaged liver due to a rifle bullet's traversing it from side to side. Three pieces of liver lying free in the abdominal cavity were removed and the abdomen was drained. This patient developed atelectasis of the lower lobe of the right lung, and a biliary fistula through both the drainage and laparotomy wounds lasting twenty-seven days. A ventral hernia developed in the last-mentioned wound and was repaired five weeks later.

Three months after receipt of the wound, six patients were back in their unit doing the same work as previously. Two months after receipt of the wound another was in a convalescent depot, and another was still in hospital convalescing from a ventral hernia repair.

Comment.—None of the patients with liver wounds became jaundiced, and none developed an infection of the liver, at least not during the follow-up period. It is possible, of course, for liver infections to occur months

after receipt of a wound, so that the prognosis must be guarded.⁽⁴⁾ This favourable outcome may be due in great part to penicillin and also to the removal of all approachable foreign bodies. No patient developed choleperitonium, but one had a biliary fistula which probably prevented its occurrence. It is wise to establish drainage in all cases of severe liver injury as a precaution against this complication.

Bowel Perforations (Nine Cases).

Five patients had an uneventful convalescence. The first had a perforated liver and a large tear in the upper part of the jejunum. The second had four jejunal perforations and a large retroperitoneal haemorrhage. The third had an abdomino-thoracic wound with a perforated lung and two small perforations of the descending colon, which were sutured. The fourth had a small perforation of the ascending colon, which was sutured, and a large tear in the transverse colon, which was exteriorized as a loop colostomy, and a perforated liver.

Three months after receipt of the wound the first three patients had for a month been back in their unit doing their usual work. The fourth was discharged from the army back to his civil occupation (clerk). The fifth was in hospital two months after receipt of his wound, about to have his colostomy closed.

The four remaining patients had post-operative complications, two due to pulmonary emboli and two due to infection.

The pulmonary emboli involved the lower lobe of the right lung in both patients. The first, who had a tangential tear of the greater curvature of the stomach and a large tear of the mesenteric border of the first jejunal loop involving the mesentery, suffered a single embolus on the eighteenth day, from which he made an uneventful recovery. The second, who had three jejunal perforations and a badly lacerated mesentery,³ suffered an embolus on the fourth and again on the fourteenth day. Recovery was uneventful, and two months later he was well and in a convalescent depot.

Both of these patients had severe mesenteric damage, for which ligation of divided jejunal vessels was necessary. Such damage is a frequent cause of pulmonary emboli and a common cause of death in cases of gunshot wound of the abdomen.

In two cases intraperitoneal infection developed.

The first patient, a native, sustained seven jejunal tears and a badly lacerated mesentery. Suture was performed six hours after receipt of the wound, but the foreign body was not found. Paralytic ileus developed and caused a rupture of the abdomen on the fifth day; the abdomen was successfully sutured. On the tenth day, a pelvic abscess (*Bacterium coli*) was drained through the rectum. When examined three months later, the patient was back on the "carrier line".

The second patient had two ileal perforations and widespread mesenteric and retroperitoneal haemorrhage. He was not examined until sixteen hours after receipt of the wound, when early peritonitis was already present. A pelvic abscess, from which a penicillin-sensitive hemolytic streptococcus was isolated, developed on the eighth day and was drained through the wound, which became infected by the same organism. A ventral hernia developed, which was repaired two months later. Two months later still, the patient was well in a convalescent depot.

This last patient shows the value of penicillin in peritoneal infection. Though its use was commenced too late to prevent a streptococcal infection, penicillin undoubtedly localized it.

Deaths (Ten Cases).

Nine patients with bowel perforations and one with a shattered liver died. Full autopsies were performed, but there were no facilities for microscopic examination of the organs.

The results in cases of gunshot wound of the abdomen depend largely on circumstances beyond the surgeon's

³ It may be noted, in passing, that a missile may cause tangential wounds of the bowel, so that an unequal number of perforations is not uncommon.

control. A series of cases in which the majority of wounds are due to high explosives or bombs will have a greater mortality rate than one in which rifle bullets are the cause of the wounds, especially if associated injuries are present as well. The earlier patients reach the surgeon, the higher will be the proportion of seriously injured patients received and hence the higher the mortality rate.⁽⁴⁾ Delay in receiving patients brings peritonitis, but it eliminates the worst cases;⁽⁴⁾ for instance, Rohlf and Snyder⁽⁵⁾ operated on their patients on an average eighteen hours after receipt of the wound, and only 20 deaths occurred in 98 cases.

Irreversible Shock Due to Anoxia of Vital Organs.

The cause of death in these severe cases is anoxia of vital organs due to the deficient circulation resulting from blood loss. Though blood transfusions have enabled men to survive injuries which would have been fatal in the last war, nevertheless there is still a small proportion of cases in which adequate resuscitation is without avail, because an irreversible state of shock exists, probably due to irreparable damage to cells of the liver, brain, adrenals, bowels and kidneys.⁽⁶⁾⁽⁷⁾

This state may cause death shortly after receipt of the wound, as in three cases in this series. The first patient died whilst being resuscitated from a badly shattered liver. The second, who had an abdomino-thoracic wound with gross involvement of lung, diaphragm and liver, a perforation of the duodenum and eight perforations of the jejunum, died during operation eight hours after receipt of the wound, having apparently been adequately resuscitated. The third patient had a shattered left sacro-iliac joint, a torn internal iliac vein, a perforated rectum and six jejunal perforations. Haemorrhage was controlled by packing, the perforations of the jejunum and rectum were sutured and a proximal colostomy was performed. In spite of a transfusion of five litres of blood, commenced eight hours after receipt of the wound, the patient died twenty-four hours later. During this time he was rational and passed a litre of normal urine.

Traumatic Uræmia.

Should the kidneys be the chief organs affected by anoxia, the syndrome of traumatic uræmia occurs.⁽⁸⁾⁽⁹⁾ In this, anoxia causes irreversible changes in the kidneys, the tubules being mainly affected as in the "crush syndrome". It may occur in any severe injury, and does not require a crush injury or gross muscle damage for its appearance.⁽⁹⁾ No myohæmoglobin is excreted, and pigmented casts are absent from the urine.

Clinically the patient responds to resuscitation sufficiently to stand operation and appears to do well for a few days. Gradually, however, a uræmic state develops, with vomiting, rising blood urea level and diminishing urinary excretion, until finally anuria supervenes and the patient dies in coma about the eighth day. Albumin, blood and casts are found in the urine.

Two patients in this series died of traumatic uræmic. They showed no evidence of transfusion incompatibility, blackwater fever or "sulphanilamide kidney". (Both had penicillin-sulphanilamide powder insufflated into the parietal wounds, but no sulphonamide was administered systemically.) Unfortunately, there were no facilities for blood urea estimations. Autopsy in both instances disclosed that all wounds were healing well and there was no evidence of infection. All organs, including the kidneys, appeared to be grossly normal.

One patient was hit by multiple mortar fragments, which caused severe damage to the abdominal wall with evisceration of the stomach, small bowel and transverse colon. There was a large tear in the greater curvature of the stomach, through which a recent meal had escaped into the lesser sac and the great omentum. There were five holes in the jejunum, and the right side of the colon was in ribbons. The lower pole of the right kidney was lacerated, and much retroperitoneal haemorrhage had occurred.

Resuscitation was commenced four hours after receipt of the wound, and an hour and a half later the parietal wound was excised, the stomach and small bowel perforations were sutured, the omentum was resected and a right hemi-

colectomy was performed. The kidney did not require surgical intervention.

The patient did well at first, but he became drowsy on the fifth day and died in coma on the eighth day. His blood pressure rose to 150 millimetres of mercury, systolic, and 100 millimetres, diastolic, on the fifth day, but slowly dropped to normal.

In the first twenty-four hours this patient received six litres of blood (including that used for resuscitation) and two litres of serum. Thereafter he had four litres of serum per day. (In such cases of renal damage, large quantities of saline solution given intravenously will do no good—in fact, they only dilute the blood and tissue fluids.⁽⁶⁾) He passed 800 millilitres of urine in the first twenty-four hours, a daily average of 1,200 millilitres in the next five days, 500 millilitres on the sixth day, 100 millilitres on the seventh day, and none on the day of his death. Hematuria was present from the damaged kidney from the first, but twenty-six hours after operation, epithelial, granular, hyaline and blood casts appeared and were present in all specimens.

Another patient was hit by a burst of machine-gun bullets, one of which caused four perforations of the terminal portion of the ileum and the others widespread muscle damage of both legs, thighs and buttocks. Resuscitation was commenced seven hours after receipt of the wound, and an hour later his wounds were excised and the bowel was repaired. He did well until the fourth day, when he became drowsy, and he died in coma on the eighth day. His blood pressure always remained at about 110 millimetres of mercury, systolic, and 80 millimetres, diastolic.

He received four litres of blood and two of serum in the first twenty-four hours, and then four litres of serum per day. He passed an average of 1,200 millilitres of urine per day until the sixth day, when he passed only 200 millilitres. On the seventh and eighth days he passed no urine at all. Albumin and epithelial, granular, hyaline casts and blood appeared in the urine sixteen hours after operation, and were thereafter present in every specimen.

Disturbance of the Heat-Regulating Mechanism.

One patient died in coma with hyperpyrexia. It is probable that anoxia caused irreversible changes in the heat-regulating centres of the brain, so that a condition similar to heatstroke arose. (In this instance, the weather, though humid, was not excessively hot.) There was no evidence of cerebral malaria. He had been receiving routine suppressive "Atebrin" treatment, and was also given ten grains of quinine intravenously for five doses, but these measures made no difference to his condition.

A high-explosive fragment caused a large tear in the greater curvature of this patient's stomach and divided the right gastro-epiploic vessels, so that he lost a great deal of blood. He was resuscitated with five litres of blood, and operation was performed four hours after receipt of the wound.

Although he had an adequate fluid intake of four litres of serum a day and passed two litres and more of normal urine per day, his temperature rapidly rose to a constant level of 107° F. in spite of all efforts to lower it, and he became unconscious. The significant feature was that he never sweated after operation, except on the third day, when there was a slight skin action and his temperature dropped to 103° F. He then became conscious, but was confused. Nevertheless, he again stopped sweating, the temperature rose to 107° F., and he died on the fourth day.

Autopsy disclosed that all organs, including the brain, were grossly normal. There was no infection of the abdominal cavity.

Faecal Peritonitis.

There were two deaths from peritonitis due to contamination of a hæmoperitoneum with liquid faeces, which had escaped from a perforation of the colon. In one case the damaged bowel was exteriorized, and in the other it was resected and a gun-barrel colostomy was performed. Both patients died on the fourth day from *Bacterium coli* peritonitis. It is well known that this type of peritonitis is most lethal in its effects, and penicillin cannot improve the prognosis because of the wide faecal contamination of the peritoneal cavity.

Associated Injuries.

One patient, who had a perforated small bowel and colon treated respectively by suture and colostomy, died from

an associated penetrating wound of the left cerebral hemisphere caused by a machine-gun bullet. He was admitted to hospital in coma, and died eighteen hours later without recovering consciousness.

Congenital Absence of the Right Kidney.

One patient was most unfortunate, in that he had only a left kidney, his right kidney and ureter being congenitally absent—a condition which occurs only once in 700 individuals.⁽⁷⁾ A bullet shattered his spleen and left kidney and perforated the splenic flexure of his colon. Splenectomy, nephrectomy and exteriorization of the damaged colon were performed. He passed no urine at all after operation, lapsed into coma and died on the sixth day. An autopsy disclosed the absence of the right kidney and ureter.

SUMMARY.

1. Twenty-seven cases of gunshot wounds of the abdomen are discussed. Eighteen patients had bowel perforations and nine solid viscera involvement only. Nine of the former and eight of the latter survived.

2. Irreversible shock due to anoxia of vital organs caused six deaths, three shortly after receipt of the wounding and three later, two from traumatic uræmia and one from hyperpyrexia. Faecal peritonitis caused two deaths, associated brain injury one and destruction of a single kidney another.

3. Of the 17 patients who survived, six had post-operative complications, two having pulmonary emboli, two abdominal abscesses, one a biliary fistula and one a wound infection. Two of these developed a ventral hernia through the laparotomy wound, in one case due to infection and in one to a biliary fistula.

4. At the end of three months ten patients were back in their unit doing the same work as previously, most of them having been back about a month, three were in a convalescent depot, and one was discharged from the army fit for sedentary work a month after his colostomy had been closed. Two were still in hospital two months after receipt of the wound, one about to have a colostomy closed and one convalescing from repair of a ventral hernia. One was still in hospital six weeks after receipt of the wound, about to go to a convalescent depot.

ACKNOWLEDGEMENT.

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REFERENCES.

- (1) S. O. Aylett and A. F. Alsop: "Surgery and Anaesthesia of War Wounds of the Abdomen", *British Medical Journal*, Volume I, 1945, page 547.
- (2) E. H. Darmady, A. H. Siddons, T. C. Corson, C. D. Langton, Z. Vitek, A. W. Badenoch and J. C. Scott: "Traumatic Uræmia. Reports on Eight Cases", *The Lancet*, Volume II, December 23, 1944, page 809.
- (3) M. E. De Baey and B. N. Carter: "Current Considerations of War Surgery", *Annals of Surgery*, Volume CXXI, May, 1945, page 545.
- (4) J. E. Dunphy: "The Therapy of Shock", *Post-Graduate Medical Journal*, Volume XXI, April, 1945, page 112.
- (5) "Traumatic Anuria", *The Lancet*, Volume I, February 24, 1945, page 244.
- (6) G. Gordon-Taylor: "Second Thoughts of the Abdominal Surgery of Total War. A Review of 1,300 Cases", *The British Journal of Surgery*, Volume XXXII, October, 1944, page 126.
- (7) J. C. Boileau Grant: "A Method of Anatomy", Third Edition, 1944, page 275.
- (8) H. Harkins, O. Cope, E. Evans, R. Phillips and D. Richards: "The Fluid and Nutritional Therapy of Burns", *The Journal of the American Medical Association*, Volume CXXVIII, June 16, 1945, page 475.
- (9) A. G. Lowdon: "War Wounds of the Abdomen. Report of Sixty-Four Cases Treated by Laparotomy", *Edinburgh Medical Journal*, Volume LI, June, 1944, page 257.
- (10) W. H. Ogilvie: "Abdominal Wounds in the Western Desert", *Surgery, Gynecology and Obstetrics*, Volume LXXVIII, March, 1944, page 225.
- (11) W. H. Ogilvie: "Some Applications of the Surgical Lessons of War to Civil Practice", *British Medical Journal*, Volume I, 1945, page 619.
- (12) C. G. Parsons: "Traumatic Uræmia", *British Medical Journal*, Volume I, 1945, page 180.
- (13) E. L. Rohlf and J. M. Snyder: "Surgical Experiences in Abdominal Wounds in North African Campaign", *Surgery, Gynecology and Obstetrics*, Volume LXXIX, September, 1944, page 286.

LIPOMATA OF THE UTERUS, WITH REPORT OF A CASE.

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A TUMOUR of the uterus containing fat cells is of considerable interest, in that less than fifty such tumours are recorded in the literature,⁽¹⁾ and some speculation is excited as to the origin of fatty tissue in an organ where fat is not usually present—where, in fact, it is practically never seen.

Under the heading of "lipomata", or fatty tumours, are described tumours which consist almost solely of adipose tissue, as well as others with a varying admixture of fibrous, myomatous and fibromyomatous elements. About one-third of the reported specimens appear to be simple lipomata, and the majority contain a good deal of fibrous tissue or smooth muscle.

A small percentage of the tumours containing fat are sarcomatous in nature, the malignant activity being found more in muscle cells than in the fat.

The clinical history of patients with fatty tumours, and their age group, symptoms, signs and prognosis, are similar to those of patients with fibromyomata. The discovery of fat within the fibroid is a surprise awaiting the pathologist, and it may not be obvious until microscopic preparations have been examined.

The majority of the tumours are found in the *fundus uteri*; a few occur in the cervix or as small polypi. Commonly five to fifteen centimetres in diameter, they are at times very small. The presence of fat may be suspected by the pale yellow colour of the tumour or by its soft consistency, which is in considerable contrast to the firm, whorled surface of a fibroid tumour, sometimes pinkish, sometimes pearly in colour.

Individual tumours may vary in the amount of fat they contain from one area to another; but the larger tumours are more likely to contain greater proportions of fibrous or muscular tissue.

Few suggestions as to the origin of the fat cells have been put forward, beyond those which had already been expressed forty years ago,⁽²⁾⁽³⁾ and little evidence has been gathered towards a complete or satisfactory explanation.

There are three possible sources of the fat cells in these tumours. They may arise from cells which retain the potentiality of differentiating into fat cells—that is, from the totipotent primitive mesenchymal cell—or from unipotent cells in embryonic rests of Cohnheim. Perhaps, also, an occasional lipoblast may have migrated into the uterus along with blood vessels and nerves, there to indulge a tumour-producing propensity. Secondly, there may be a metaplasia of already differentiated cells in the uterus, a transformation of connective tissue or of fibrous or muscular tissue into fat. Finally, connective tissue cells, or muscle cells, of uterine origin may undergo fatty degeneration. The occurrence of tiny fat droplets in connective tissue or muscle cells in some of the tumours containing large fat cells suggests to one author⁽⁴⁾ that the latter may have arisen by way of fatty degeneration of the normal tissue elements, but to another⁽⁵⁾ that the fat cells come from a specially differentiated connective tissue. Baniecki⁽⁶⁾ hints at a possible relationship with *diabetes mellitus*.

It can hardly be thought that a true lipoma is a degeneration of muscle or connective tissue cells, but rather it is a proliferation of fat cells, whether their precursors in the substance of the uterus are totipotent cells of the primitive mesoderm or awakened embryonic rests. In the majority of the tumours in which fibrous tissue and smooth muscle play a large part, these cells are healthy and show little degenerative change; they do not resemble the cells of fibromyomata in which fatty degeneration has taken place. I have found no mention of the presence of fat cells in

an otherwise normal uterus, but on two occasions I have seen a small group of typical fat cells on routine examination of sections, once from the cervix and once from the *fundus uteri*. No abnormality in those sections could suggest a reason for the presence of the cells.

The mixed mesodermal tumours of the uterus, with their striated muscle and cartilage, illustrate the diversity of tissues which may arise within the uterus, and the production of a simple tissue such as fat should not be deemed beyond the capabilities of this organ. It seems reasonable to attribute the fat cells of the true lipomata and of most of the fibromyolipomata to cells laid down in the *Anlage* of the uterus, which have retained the potentiality of developing into mature adipose tissue.

Report of a Case.

M.N., a married woman, aged fifty-seven years, was admitted to hospital in January, 1941. She had been attending the out-patient department with a complaint of indigestion; a test meal examination revealed hypochlorhydria, and subsequent administration of hydrochloric acid gave her some relief. All her five children were well. The menopause had occurred three years previously, after which she had had no further blood loss until seven weeks prior to her admission to hospital, when she had noticed a slight spotting of blood. On examination of the patient, the uterus was found to be enlarged to about the size of a pregnancy of four months' duration. Recently she had experienced some frequency of micturition, but no scalding. Total hysterectomy was performed by Dr. L. S. Kidd, and the specimen was sent to the pathology department with the label "fibroma". The Fallopian tubes and the ovaries did not appear to be diseased.

On pathological examination, the uterus presented a smooth, rounded appearance. On bisection the specimen was seen to consist of a rounded tumour seven centimetres in diameter, the muscular wall of the uterus being stretched thinly round it. The tumour lay in the anterior wall of the uterus, a long, curved, narrow cavity running upwards behind the mass. Only part of the cervix was present. The tumour itself was pale in colour, with a yellowish tint. It was slightly lobulated, and the surface was smoother than a fibromyoma and did not show the firm, tight whorls of that type of tumour. The consistency was soft, much softer than that of a fibroid tumour, but firmer than that of normal adipose tissue.

Microscopic examination revealed the presence of a large amount of normal fat tissue, supported by a fibrous framework (Figure 1). While fat comprised about 70% of the

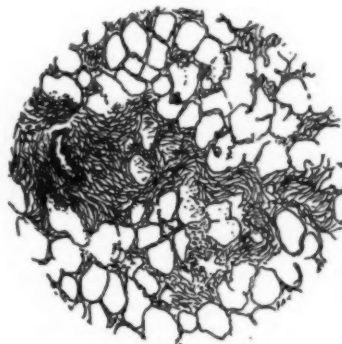


FIGURE 1.

Showing the relative proportions of fat and fibrous tissue in a typical field.

tumour, and fat cells were seen in every low-power field. Fibrous tissue predominated in some areas. After differential staining, smooth muscle fibres were identified, but only in the walls of blood vessels and not as part of the tumour itself. A diagnosis of lipofibroma of the uterus was made.

Acknowledgements.

I wish to thank Dr. L. S. Kidd for his permission to report this case, and Mr. G. Aubrey-Crowe for the drawing.

References.

- (1) F. L. Ritter and S. W. Stringer: "Lipoma of Uterus", *The American Journal of Obstetrics and Gynecology*, Volume XL, 1940, page 501.
- (2) J. H. M. Knox: "Lipomyoma of the Uterus", *The Bulletin of the Johns Hopkins Hospital*, Volume XII, 1901, page 38.
- (3) A. Sitzenfrey: "Drei seltene Geschwülste", *Zeitschrift für Geburtshilfe und Gynäkologie*, Volume LXVII, 1901, page 32.
- (4) A. G. Ellis: "Lipoma of the Uterus", *Surgery, Gynecology and Obstetrics*, Volume III, 1906, page 658.
- (5) H. Williamson and R. St. L. Brockman: "Fibro-Myo-Lipomata of Uterus", *The Journal of Obstetrics and Gynecology of the British Empire*, Volume XXVIII, 1921, page 290.
- (6) A. C. Starry: "Fatty Tumours of the Uterus", *Surgery, Gynecology and Obstetrics*, Volume XLI, 1925, page 642.
- (7) H. Baniecki: "Lipomyom des Uterus und Diabetes Mellitus", *Archiv für pathologische Anatomie und Physiologie*, Volume CCLXXXVII, 1932, page 483.

THE TREATMENT OF INGUINAL HERNIA.

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INGUINAL HERNIA is one of the commonest of surgical disorders which requires treatment by operation. The Bassini operation, which was introduced in 1888, is one of the most important milestones in surgical progress. As Professor Grey Turner is often in the habit of pointing out, the surgical treatment of hernia has in the past been of the utmost importance, since so much of our modern surgical knowledge and operative technique has been built up around hernia operations. The Bassini operation since its introduction has undoubtedly cured millions of sufferers; but the results have fallen short of 100%, and the operation has therefore undergone innumerable modifications. In fact, if one inspects the records of any hospital, one will usually see the procedure employed entered on the documents as "modified Bassini operation". The soundness of the Bassini operation was first contested in 1899 by R. Hamilton Russell, who held that all herniæ were congenital in origin—that is to say that the sac has been present always and has remained a potential source of hernia until increased intraabdominal pressure has forced something into it and caused it to become distended and clinically evident. Hamilton Russell held that weakness of the musculature had primarily nothing to do with the production of the hernia, but was secondary to its presence. Russell regarded the inguinal canal as a sphincter normally in a state of tonus which increased reflexly when the intraabdominal tension was raised by physical exertion—straining, micturition, coughing *et cetera*. That is to say, the muscles contract isometrically. That a process of peritoneum passes through the inguinal canal into the scrotum, which should close before birth, is accepted by embryologists; but Russell's contention that femoral hernia, direct hernia and herniæ in other sites are all due to a preformed sac depending upon a process of peritoneum following the blood vessels which emerge from the abdomen has been disputed, and the weight of opinion is now against it. Russell therefore concluded that since the presence of the sac was the primary cause of the hernia, removal of the sac alone was sufficient to effect cure, and that any meddling with the mechanism of the inguinal canal was not only superfluous but actually harmful, since attempts to close the canal by suturing the conjoint tendon to Poupart's ligament would be likely to cause atrophy of the former structure and thus favour recurrence or the development of a direct hernia. Russell's theory was vigorously attacked at the time when it was put forward, especially on embryological grounds by Sir Arthur Keith, and surgery has been slow to adopt the Russell principle in operations. Russell practised surgery at Melbourne, and while a number of Australian surgeons follow his procedure, others prefer the Bassini technique or one of its modifications, holding that recurrences follow the Russell operation and that they have seen recurrences in patients who had actually been operated upon by

Hamilton Russell himself. Recently, however, there has been rather a swing back to simple excision of the sac as opposed to more complicated procedures, there being no substantial evidence to support any claim for a lower rate of recurrence from such procedures. Philip Turner has advocated simple removal of the sac in children without division of the external ring. The soundness of the Bassini operation has also been challenged by Ogilvie and others, and recently Brandon (1945) in a carefully considered paper has emphasized the value of simple excision of the sac in suitably chosen cases. Brandon quotes Saint Thomas's Hospital statistics, which rather tend to suggest that simple excision of the sac is followed by a recurrence rate of approximately half that of the alternative procedures which are now popular—namely, the operation associated with the names of Bassini, Fowler, McArthur, Bloodgood and Gallie.

Caution should be exercised, however, in the acceptance of any hernia statistics at their face value, since other factors than the technique employed may contribute to failure. This point will be discussed below. Moreover, it is in the apparently less favourable type of case that the surgeon is often tempted to employ one of the more ambitious procedures. There is much truth in what Hamilton Russell used to say, when he emphasized that much more could be learnt from one case carefully and minutely studied than from all the statistics which were ever published. The essence of the matter is that while simple excision of the sac suffices for the vast majority of indirect herniæ, each case should be carefully considered on its merits, and the procedure adopted should be varied according to what is demanded by the conditions found. In other words, no single stereotyped operation will meet the needs of every case in every set of circumstances.

Causes of Recurrence.

1. The Bassini operation is faulty in principle and interferes with the efficiency of the sphincteric mechanism of the inguinal canal. Exposure demands dislocation of the cord and unnecessary trauma. Suture of the conjoint tendon to Poupart's ligament may be followed by atrophy, especially if large bites of tissue are taken and the sutures are tightly tied. In any case, as Wakeley (1940) points out, it is difficult to secure any sound union between muscle and tendon. In by far the majority of instances in which an operation for recurrence is performed, exploration reveals that the original operation was of the Bassini type.

2. Failure carefully to isolate the sac and remove the whole of it appears to be a potent factor in the production of recurrence. In carrying out operations for recurrence it is not uncommon to find what appears to have been the original neck *in situ* and a nodular mass indicating the site of the original ligature below it. The operator had evidently relied on his attempts to obliterate the canal to prevent recurrence. As Edwards (1943) puts it, "the original hernia is reproduced".

3. The use of catgut is probably a fairly common contributing factor. The tissues of some patients have the faculty of digesting catgut quickly, and sutures, especially when tied with some degree of tension, tend to give way. This may be one of the reasons why the recurrence rate after the Bassini operation is not higher than it is. Catgut also causes a tissue reaction, and in addition, to borrow a term from Leriche, "subinfection" if not actual suppuration. This is especially likely to develop under tropical conditions, and it is not uncommon to find at a subsequent operation for recurrence that the incision in the external oblique aponeurosis has become undone. Unabsorbable sutures are preferable, and with careful technique the risk of a persistent sinus is negligible. I have abandoned silk in favour of fine braided nylon ("Deknatel"), and with this material more than two hundred hernia operations have been carried out in tropical climates without the slightest trouble in securing primary healing; further, as far as can be ascertained, there has been no subsequent evidence of sinuses or "stitch abscesses". Interrupted sutures are to be preferred, but as Haxton (1945) points out, continuous nylon sutures can be used with impunity.

4. A history of ineffective and inadequate after-treatment can be obtained in a large proportion of cases in which recurrence has followed within a year or so of the original operation. This occurs in military practice, and it is due either to failure on the part of the surgeon to give instructions that no severe physical exertion or weight-lifting be indulged in for at least three months, or, more commonly, to the surgeon's instructions having been disregarded. The loading of heavy boxes onto a truck is apt to be regarded by some people as "light work". In civil practice the patient, who may be a labourer, may himself be at fault.

5. Unskilled operating is often held to be a frequent source of recurrence, and it is stated that the recurrence rate is likely to be high in institutions where hernia operations are relegated to inexperienced house surgeons. The obvious remedy is not to take this class of work out of their hands, but to teach them to do it properly.

6. Complicated operations usually defeat their own object. Operations which distort normal anatomy, like Halstead's and Schmeiden's, are fundamentally unsound; recurrences follow, and it is questionable whether a more simple procedure would not have been better in the first instance. Recently I have seen a patient who had undergone a bilateral Halstead operation eight months previously, which was followed by bilateral recurrence and bilateral testicular atrophy. Recurrences follow the Gallie operation. This operation has a distinct sphere of usefulness; but the idea of using "living" sutures has captivated surgical imagination, and the procedure is often used as a routine measure for cases in which it is not required, and the operation is thus likely to be brought into disrepute. Fascial sutures are not without disadvantages. They require careful fixation with silk, and the large needle used to insert the miniflicts appreciable trauma. Fascial sutures do not grow and "become incorporated in the tissues". At operations for recurrence they can be seen apparently unaltered by any growth. Silk or nylon would in many instances have been equally effective.

When recurrences follow one of the more complicated "repairs" the surgeon is often faced with a difficult problem. When recurrence follows simple removal of the sac the surgeon has undamaged tissues to deal with at the subsequent operation, and this is in itself a strong argument in favour of the latter procedure.

7. Failure to suture the *fascia transversalis* has been cited as an omission which may favour recurrence. While this fascia may be found to be a strong sheet of tissue in cadaver dissections, it is a variable structure. When the sac is isolated by gauze dissection and twisted before the ligature is applied, the defect in the fascia is probably sufficiently approximated to allow it to heal over without sutures. W. J. Lytle (1945), who has made careful anatomical studies of the inguinal canal, recommends that the internal ring be narrowed by sutures inserted from below upwards, but admits that twisting of the sac prior to ligature probably draws the *fascia transversalis* together sufficiently to produce a narrowing of the ring. In many hernia it is difficult to find anything but some filmy tissue, and dissection and retraction necessary to suture firmer material may do more harm than good. The influence of the *fascia transversalis* in preventing recurrence is probably not of great importance. The principal offender is the sac itself acting as a dilator.

8. Errors in diagnosis may lead to pseudo-recurrence. A sac may be bilobed and only one loculus may be removed. Inguinal sacs have occasionally been removed when the patient has actually been suffering from a femoral hernia. The importance of precise diagnosis cannot be over-emphasized. When a patient states that his hernia recurred soon after his discharge from hospital, it is probable that the wrong sac was removed.

9. Patients suffering from chronic cough, stricture, prostatic enlargement or severe chronic constipation are unfavourable subjects for operation. Operations upon very old people, or upon those of poor physique with tissues of poor quality, and upon the very obese, may be expected to have a somewhat higher recurrence rate. Previous

suppurative inguinal adenitis may considerably weaken the tissues.

Operation for Inguinal Hernia.

Anæsthesia.

If one wishes to ascertain the competency of the sphincteric action of the inguinal canal, it is obvious that its action must be actually witnessed. Local infiltration with "Novocain" enables the contraction and any descent of the conjoined tendon to be seen and felt. Local infiltration, moreover, permits the patient to cough, and the sac can readily be found and its limits determined. Local infiltration has two disadvantages. One is the fact that the healing powers of the tissue are slightly interfered with and there is a small addition to the risk of infection, and the other is the fact that traction on the peritoneum during the manipulations necessary for isolation and high ligation of the sac sometimes causes pain and vomiting.

Spinal analgesia lacks these drawbacks, and I now use it as a routine method. Six to eight millilitres of a 1 in 1,500 solution of "Nupercaine" are injected moderately slowly into the spinal theca, and the patient is turned face down at once with a small pillow under the epigastrium and kept face down for seven minutes. The table is tilted to 10° of "head-down" position, and this tilt is maintained during operation. This gives satisfactory anaesthesia of the sensory roots, while voluntary movement of the abdomen and legs is retained. The patient is able to contract the abdomen and to cough.

Operative Technique.

The drapes are arranged so that one towel clip is on the anterior superior iliac spine and another is just above the root of the penis. The incision is three and a half inches long; it commences three-quarters of an inch lateral to the penis and half an inch below and parallel with the edge of the upper towel. The skin, fascia of Camper and fascia of Scarpa are incised in the same line. Branches of the superficial inferior epigastric and the superficial external pudendal vessels are caught and ligated, and other small bleeding points are seized in fine-pointed hæmostats and twisted at the conclusion of the operation. Skin towels are then clipped to the edges of the incision, the instruments are discarded and gloves are sluiced in antiseptic lotion. The external ring is then sought and two small Kocher forceps are clipped on to it for subsequent identification, and the external oblique aponeurosis is incised in the direction of its fibres, which is roughly the same as that of the wound. It is not necessary extensively to clear the aponeurosis of fascia. The cut edges are retracted upwards and downwards by being clipped with tissue forceps. If it is remembered that the sac of an indirect hernia passes from above downwards in front of the contents of the cord, it is easily found. Without disturbance of the cord, an incision is made parallel with and at the upper part of the cord, passing through the cremaster, the cremasteric fascia and the infundibuliform fascia—which, incidentally, may exhibit more than one distinct layer—and the sac is exposed. The patient is then asked to cough, and the extent of the sac can be seen. The sac is then seized with forceps and isolated as far as possible by sharp knife dissection, the isolation of the neck being completed by gauze stripping. If the sac is large and adherent, the distal portion need not be dissected out. If it is cut off and incised longitudinally, the subsequent development of a funicular hydrocele need not be feared. The sac is opened to ensure that it is empty, twisted, transfixed and ligated flush with the peritoneum. When released, it retracts into the abdomen out of sight.

The patient is again asked to contract the abdominal wall or to cough. The efficacy of the removal of the sac is inspected and the physiological action of the conjoined tendon observed. If as in the majority of cases both appear satisfactory, nothing more is done and the wound is closed. A few interrupted sutures close the incision in the infundibuliform and cremasteric fascia, and the external oblique aponeurosis is then examined for slackness. If none is present, the aponeurosis is united with inter-

rupted sutures one-quarter of an inch apart or else by a continuous stitch. If slackness is present, excess is taken up by overlapping of the edges with interrupted sutures. If the external ring previously examined was found to be large, it is reduced by sutures to normal proportions—that is to say, to a size at which it just admits the tip of the finger. The external oblique thus braces up the deeper muscles and allows them to shorten. The skin incision is closed by four sutures, one-quarter inch from the edge, passing through all layers down to the deep fascia, and intermediate sutures unite the skin edges.

Before the external ring is examined the gloved hands are washed with antiseptic solution; but otherwise "no-touch" technique is observed throughout. If it is necessary to handle the tissues, they are seized with gauze. Tying with forceps and the use of the Singer suturing instrument completely eliminate the risk of contaminating the suture material.

Fine braided nylon thread is used throughout, and ends are cut short over triple knots. If the neck of the sac seems rather bulky for fine material, to save trouble the thread is put in double.

After-Treatment.

The patient is kept strictly in bed for twenty-one days after operation, and deep breathing exercises are carried out from the start to maintain the tone of the abdominal musculature. The more elaborate exercises preferred by physical therapists are not essential. The stitches are taken out when the wound has healed—that is to say, in about five or six days. The patient is allowed up on the twenty-first afternoon and permitted to walk about. He is discharged from hospital a day or so later, and emphatically warned against strenuous exertion, especially the lifting of weights, for three months; otherwise normal activity and sport are unrestricted. Double hernia may be repaired at one sitting with a complete change of gloves and instruments. A. K. Henry's approach through a mid-line incision with extraperitoneal ligature of both sacs is more difficult, but the principle is much the same.

Difficult Hernia.

Less favourable hernia for operation comprise very large inguinal hernia with stretching and atrophy of the surrounding tissues; direct hernia, in which atrophy is nearly always present; and recurrent hernia. To minimize the risk of recurrence something more than simple removal of the sac is necessary. The proportion of cases in which a more elaborate operation is required varies according to the type of practice. For routine practice in civilized countries, simple removal of the sac should suffice in at least 90% of cases; but amongst backward communities, especially in oriental countries, one finds a larger proportion of the neglected type of hernia. For these patients it is doubtful whether any stereotyped "cookery-book" type of operation can be relied upon for every type of hernia and in every circumstance, and the operation should be "tailor made" to suit the needs of the individual patient. Surgical ingenuity can select one of a number of procedures. In Bloodgood's operation a flap of fascia is turned down from the anterior rectus sheath and sutured to Poupart's ligament. There may be difficulty in securing a large enough flap, and a weak spot in the abdominal wall is left. Philip Turner's patch can sometimes be used with advantage. A flap of fascia lata hinged on Poupart's ligament is turned up under the latter structure and sutured to the transversalis fascia, or better still, with very slight tension to the conjoined tendon. The flap may require a separate incision, but it can be obtained by stripping down and retraction—a somewhat bloody procedure, as many small vessels are present. This, again, has disadvantages. A weak part is left from which the fascia has been taken, and it may be impossible to get enough fascia. There is also some risk of injuring the femoral nerve and vessels. A free fascia lata graft may be used instead.

Gallie's fascia lata repair may be employed with advantage in certain cases. However, large amounts of fascia lata cannot be taken with complete impunity, as the

resulting defect may itself subsequently worry the patient. For large hernial defects a silk lattice or floss-silk darn may be the only course open. The slight risk of infection in these cases, in which a large amount of foreign material is introduced, cannot be dismissed lightly. In the event of such a misfortune the results are truly disastrous, and the unfortunate patient may spend many months in hospital.

Recently Mair has claimed success in the use of whole-skin grafts to close hernial defects. Apparently he has had no trouble with sepsis, and the epithelial elements of the skin seem to disappear.

Lately there has been some tendency to revert to McGavin's silver-wire filigree. This method never enjoyed wide popularity, and any unfortunate supervention of sepsis left the surgeon with an extremely difficult problem. However, it seems that in successful cases the cure has been permanent and complications have been infrequent (Grey Turner, 1943). This operation may in the future have a limited but distinct scope, especially since new metals like vitallium and tantalum, which are much more readily accepted by the tissues, are available.

Summary.

1. The case for simple excision of the sac to cure oblique inguinal hernia has been stated.
2. The causes of recurrent hernia have been discussed.
3. The value of local and spinal anaesthesia in determining what procedure is indicated in hernia operations has been given emphasis.
4. The technique of an operation based on Hamilton Russell's operation has been described in detail.

Bibliography.

- W. J. M. Brandon: "Inguinal Hernia; House that Bassini Built", *The Lancet*, Volume I, February 10, 1945, page 167.
 H. C. Edwards: "Inguinal Hernia", *The British Journal of Surgery*, Volume XXXI, October, 1943, page 172.
 H. Haxton: "Nylon for Buried Sutures", *The British Medical Journal*, Volume I, January 6, 1945, page 12.
 W. J. Lytle: "The Internal Inguinal Ring", *The British Journal of Surgery*, Volume XXXII, April, 1945, page 441.
 G. B. Mair: "Preliminary Report on the Use of Whole Skin-Grafts as a Substitute for Fascial Sutures in the Treatment of Hernia", *The British Journal of Surgery*, Volume XXXII, January, 1945, page 351.
 R. Hamilton Russell: *The Lancet*, Volume II, 1899, page 1353; also personal communications.
 F. V. Stonham: "Nylon", *The Indian Medical Gazette*, Volume LXXVII, 1942, page 283.
 D. C. Turner and G. Grey Turner: "Modern Operative Surgery", 1943, page 1049.
 R. F. Rowlands and P. Turner: "The Operations of Surgery", Eighth Edition, 1937, page 27.
 C. P. G. Wakeley: "Treatment of Certain Types of External Hernia", *The Lancet*, Volume I, May 4, 1940, page 822.

Reports of Cases.

RUPTURE OF THE LIVER IN THE NEW-BORN: RECOVERY AFTER BLOOD TRANSFUSION AND LAPAROTOMY.

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THE following case is reported in view of the comparative rarity of the condition and because recovery from it appears to be exceptional.

Clinical Record.

R.E., a male infant, aged two days, was admitted to the Brisbane Children's Hospital at 2 p.m. on December 29, 1944, because of pallor, breathlessness and inability to suck. These symptoms had first appeared that morning, approximately thirty-six hours after the child's birth. The child had been born at full term; he weighed nine pounds

and had presented by the vertex. The obstetrician in attendance had been obliged to use forceps for the head and had experienced some difficulty with the shoulders, but had exerted no force on the trunk. Resuscitation had not been required. None of the mother's four previous confinements had been easy, as her pelvic measurements were small. Her first baby weighed ten pounds and was stillborn; the other three needed instrumental delivery.

When first examined the infant was noticeably pale and looked ill. His breathing was hurried (88 respirations to the minute), but not laboured. The temperature was 100.2° F. No other abnormality was discovered at the initial examination, and a provisional diagnosis of pneumonia was made. During the next two hours the baby's condition deteriorated rapidly. By 4 p.m. he was much paler and had grown restless. His breathing had become gasping and typical of air-hunger. The pulse was almost imperceptible. His abdomen was found to be slightly distended and dull on percussion all over the right side and in the left flank. It was now reasonably certain that the child had a massive intraperitoneal hæmorrhage.

Blood transfusion was started immediately, stored group O blood from the hospital blood bank being used without a delay for cross-typing. The large amount of 200 mls of blood was given rapidly and another 100 mls were added during the next four hours. One ml of a vitamin K preparation was injected intramuscularly. The transfusion was of immediate benefit; the infant's colour returned and his distress abated; but his abdomen remained distended and dull on percussion in the flanks.

Operation was performed at 8 p.m. under anaesthesia with ether given by the "open" method combined with local infiltration of the abdominal wall. On the assumption that the liver was the most likely organ to be involved, the abdomen was opened by a right upper paramedian incision. The peritoneal cavity was found distended with blood and blood clot, and exploration revealed a deep fissure, two inches long, in the antero-superior surface of the right lobe of the liver close to the mid-line. Blood was oozing freely from the torn liver substance.

Owing to the friability of the liver, attempted closure of the gap with mattress sutures proved unsatisfactory. However, the fissure was so fortunately placed that it was possible to suture the torn edges of the liver capsule to the cut edges of the parietal peritoneum. This had the effect of shutting off the peritoneal cavity from the source of the bleeding and rendered the oozing laceration in the liver subject to control by external pressure. A strip of the right *rectus abdominis* muscle, with a pedicle at the lower end, was placed in the fissure in the liver substance and the abdominal wall was closed. No gauze packing was used. Firm pressure was applied by strapping over dressings.

The hæmoglobin value, estimated just before the blood transfusion, was 52%. Four days after the operation it was 95% (100% = 13.8 grammes of hæmoglobin per 100 mls).

Apart from some post-operative vomiting and slight delay in wound healing, the baby made an uneventful recovery and was discharged from hospital in good health fourteen days later. When examined at the age of seven months he was in magnificent condition and weighed 20 pounds.

Comment.

The comparative rarity of rupture of the liver in the new-born has been mentioned. Nevertheless, the "Quarterly Cumulative Index Medicus" refers to seven case reports in the past seven years, and the condition is described in a few obstetric text-books. There is a good account in Ehrenfest's monograph on birth injuries.⁽¹⁾ He quotes Palmer,⁽²⁾ who, investigating the cause of 144 foetal deaths, found five cases of liver injury, three in which deep tears were present, and two in which the lesions were merely subcapsular hæmorrhages. Several writers quote Lundquist,⁽³⁾ who encountered at post-mortem examination five deep parenchymatous injuries of the liver among 49 instances of intraabdominal hæmorrhage in the newly born. No doubt the condition is sometimes overlooked

and would be met more often if more post-mortem examinations were made.

With regard to the causation, it is surprising that the large friable liver of the new-born, which often projects well below the protecting ribs, is not ruptured more often. Extraction of the trunk during breech delivery and the application of strong fundal pressure are quoted by Berkeley, Bonney and MacLeod⁽⁴⁾ as possible ways in which the liver may be injured. To this list accidental blows on the mother's or child's abdomen and vigorous attempts at resuscitation must be added. The most interesting ætiological fact, however, is that in some well-attested cases (for example, Berry's⁽⁵⁾) the condition appears as a spontaneous one, the trauma incidental to normal delivery sometimes being enough to produce the damage. This was almost the case in the present instance.

The delay in the onset of symptoms is characteristic. To quote Ehrenfest:⁽⁶⁾

From the viewpoint of diagnosis it is striking that infants, eventually dying from a ruptured liver, apparently as a rule seem perfectly normal for approximately the first three days of life. Symptoms of serious illness do not manifest themselves until a considerable amount of extravasated blood has reached the peritoneal cavity. Then death is prone to occur suddenly and unexpectedly.

It seems likely that a subcapsular hæmatoma forms first and that urgent symptoms supervene only when the capsule eventually gives way.

Rupture of the liver in the new-born has always been regarded as a fatal condition. Schmitt,⁽⁷⁾ from a review of the literature, concluded that prophylaxis, diagnosis and treatment were alike unsatisfactory. Tow⁽⁸⁾ said of these cases: "Most children who survive the first twelve hours appear fairly normal for a couple of days. Then they suddenly become ill, go into shock and die within a few hours without presenting any local physical signs." Ehrenfest, in his account of the disease, quotes a number of cases, all fatal. He refers to the "usually quite unexpected discovery (at post-mortem examination) that the liver has been injured". He does not mention survival. The available literature records only fatal cases, the diagnosis being made *post mortem*.

The infant whose recovery after blood transfusion and laparotomy is here reported was in the following ways fortunate: he was vigorous and above average weight; he came under observation in time; and the fissure in his liver was in an accessible place.

References.

- (1) H. Ehrenfest: "Birth Injuries of the Child", 1931, page 286.
- (2) Palmer: Medical Research Council of the Privy Council, Special Report Series Number 118, 1928; quoted by Ehrenfest, *loc. cit.*
- (3) B. Lundquist: "Intrathoracic and Intraabdominal Hæmorrhages in the Newly Born", *Acta obstetrica et gynecologica Scandinavica*, Volume IX, 1930, page 331; quoted by Ehrenfest, *Tow et al.*
- (4) C. Berkeley, V. Bonney and D. MacLeod: "The Abnormal in Obstetrics", 1938, page 422.
- (5) J. A. Berry: "Fatal Hæmorrhage from the Liver in an Infant Five Days Old", *British Medical Journal*, Volume I, 1926, page 825.
- (6) F. T. Schmitt: "Etiology of Rupture of the Liver in the New Born", *Zeitschrift für Geburtshilfe und Gynäkologie*, Volume CXIV, 1936, page 70; abstracted in *American Journal of Diseases of Children*, Volume LIV, 1937, page 864.
- (7) A. Tow: "Diseases of the New Born", 1937, page 108.

REPORT OF A FATAL CASE OF "BLAST" INJURY OF THE SPINAL CORD.

By D. LESLIE,

Major, Australian Army Medical Corps.

It is realized that the data with regard to this case are incomplete in many details, but none the less it may be of interest in showing the serious effects which can be produced by bomb blast injury of the spinal cord without apparent bony lesion.

Clinical Record.

The patient, aged twenty-one years, was admitted to an Australian general hospital on the evening of October 10, 1943, uræmic, unable to give a history, and with a temperature of 106° F. He had no external wound but a large bed sore. He appeared to be anaesthetic to the level of the sixth cervical vertebra, and did not move legs or trunk. There were occasional weak movements of the shoulder girdle, but otherwise no movement of the arms. His bladder was distended to the umbilicus.

From the notes accompanying the patient it appeared that he had been injured by bomb blast on October 1 (nine days previously) and that his symptoms and signs developed at once and gradually increased. Thus, when he was examined by his regimental medical officer, he could feel and localize pin pricks in both legs, but when examined at the field ambulance later during the same day he could not do so. He had no plantar response of any sort from the outset. His bladder was catheterized on October 9 at the field ambulance, and he was then evacuated, his bladder being catheterized at least once more during evacuation. It was reported on the day of injury that he had no tenderness or palpable abnormality of the skull or spine. Records showed he had received 76 grammes of sulphaguanidine.

On his admission to hospital, suprapubic cystostomy was performed without anaesthesia and gross cystitis was seen to be present. His condition did not improve and he died ten hours after admission to hospital.

Post-Mortem Examination.

Post-mortem examination revealed bilateral pyelonephritis, it being possible to express pus from the apices of the pyramids of both kidneys. With regard to the central nervous system, the pathologist reported that the brain was normal. In the middle to lower part of the cervical portion of the spinal cord there was an area extending for about one and a half inches in which a brownish discoloration and considerable loss of normal texture were present. The area appeared necrotic and softened. The cord was frozen and cut into sections. Above and below the area of softening the cord was a little congested, but there was no sign of old or recent hæmorrhage; otherwise it appeared normal. No deformity of the bony vertebral canal was seen during the removal of the cord. No X-ray picture was taken.

Comment.

It is regretted that two important pieces of information were not available—an X-ray picture of the cervical part of the spine and a history from the patient himself as to the nature of the trauma—whether the injury was purely one of blast or whether there was some other factor such as a fall or a blow.

Reviews.

PSYCHIATRY AND MODERN WAR.

DR. R. S. ELLERY has a well-earned reputation for dealing entertainingly with controversial matters. It is maintained in "Psychiatric Aspects of Modern Warfare".¹

In his opening chapter he draws attention to the frailty and fallibility of the human spirit. We must keep our feet on the earth of reality, for is not man "this featherless biped with brains—this monarch of misrule—this sinner-saint of creation! In his intellect how like a god! In his behaviour how like a hyena!" and "Men and women may reverence truth in the abstract, but when the feelings are stirred they will always incline to the cock and bull".

The author pleads for the debunking of war. Good people allow themselves to be stampeded into war through ultranationalism. "The bad people are politicians and members

of political groups—industrialists, financiers and speculators who put the pursuit of personal profit above any considerations of justice and decency, and who, for their own selfish interests, never scruple to exploit the ill-balanced emotions of men for the most base and ignoble ends." Among them are included the great German and Japanese dictators who by a perverted psychology give "men and women a belief—not in goodness, but in greatness".

In order to underline the brutishness of war, the book is illustrated by a series of drawings by Goya, brilliantly conceived and executed more than a century ago. With the Japanese atrocities before us, we have the realization that sadism in war is not a new phenomenon.

This book was written for a nation in arms. Although the end of hostilities has not altered the main thesis, it has shifted the viewpoint. Dr. Ellery, in showing the great need for psychiatrists, emphasizes the necessity for the psychiatric overhaul of recruits. Rightly he stresses the view that in the production of neurosis and psychoneurosis "the precipitating factors—difficulties in adjustment, fear, fatigue, trauma and other noxious accompaniments of war—produce psychiatric casualties chiefly among those who are predisposed".

In regard to the forms of mental disease and the types of treatment the outlook is conventional. As the disease is a reaction of the whole organism, prognosis and treatment must be based on broad lines.

There is a plea for a psychiatric consultation centre to which men could go for frank and homely discussions of their emotional problems. Running through the pages of this book is the emphasis upon the need for a background of faith. Man for his mental health must have a feeling of present and future security. Dr. Ellery points out that in a changing world, some religious props are losing their hold. "Our anxiety arises from the loosening of those emotional bonds which once existed between man and his celestial God-image." The author holds that: "A new faith must be found—a new formula devised for the re-direction and sublimation of aggressive instincts. This may come through psychology and the keener understanding of the human mind." With this theme there can be little disagreement, though there is a very considerable doubt as to the ideal type of ideology.

No consideration of war would be complete without mention of its aftermath. In a later edition Dr. Ellery should amplify this. More could be said of the unconscious pension hunter. Dr. Ellery hints at the emotional unrest which we are today seeing in a world-wide series of strikes when many are hungry and homeless. He foresees the inescapable results of juvenile mismanagement which is worthy of repetition.

Society's shabby treatment of its war-time adolescents will demand a reckoning in the near future. Psychiatrists, educators and social workers will have to be prepared to handle that great batch of emotional problems which will follow in the wake of war, arising out of the defective or precocious development of youth. They will have to meet aggressions undisciplined and rebelliousness which flouts authority, frustrations and maladaptations which have led to neurotic incapacity, conduct disorders incidental to deficient education, and damaged personalities taking refuge in dependency.

The book has a useful glossary of psychological terms and is written so as to be easily understandable by the non-medical reader. The field of psychiatry is enormous, its tollers are few, its needs are great. Only by the wider diffusion of such knowledge shall we achieve progress. This interesting book points the way.

THE SURGERY OF PEPTIC ULCERATION.

NISSEN's recent work on the technique of resection in duodenal and jejunal peptic ulcer is an intensely interesting study.¹ As Wangenstein points out in his foreword, although remarkable reductions are being effected in the mortality of appendicitis and intestinal obstruction, the mortality of peptic ulcer has remained unimproved by therapeutic procedures during the last three decades. Though in the past

¹ "Psychiatric Aspects of Modern Warfare", by R. S. Ellery, M.D., F.R.A.C.P.; 1945. Melbourne: Reed and Harris. 8½" x 5½", pp. 191, with 8 illustrations. Price: 12s. 6d.

¹ "Duodenal and Jejunal Peptic Ulcer: Technic of Resection", by Rudolf Nissen, M.D., with a Foreword by Owen H. Wangenstein, M.D., Ph.D.; 1945. New York: Grune and Stratton. 8½" x 5½", pp. 144, with 123 illustrations. Price: 34.75.

the distrust of physicians in the ability of surgeons to overcome the ulcer diathesis of a patient with a duodenal ulcer has not been without foundation, this surgical empiricism is now coming to an end. The problem facing the surgeon is, of course, twofold, in that he must not only maintain a low mortality rate for his operations, but at the same time he must complete a procedure which will rarely be followed by jejunal ulceration. Because the mortality rate is the more immediately pressing of these two requirements, surgeons who feel that they must abandon gastroenterostomy because of its high incidence of subsequent stomal ulceration, have been attracted towards the exclusion forms of gastrectomy. Nissen, however, regards retention of the pyloric antrum as incompatible with cure of the ulcer diathesis, and maintains that the secondary ulceration rate in these operations is little if any less than that which follows simple gastro-jejunostomy.

The main purpose of his book is to show that even in the presence of formidable penetrating duodenal ulcers it is possible to make a partial gastrectomy which includes removal of the pyloric antrum, and yet to keep the mortality rate under 3%. The secret of success is related to the safe closure of the duodenal stump, and with the help of numerous illustrations the author describes a procedure which includes three essential stages, namely, adequate mobilization of the anterior duodenal wall, ample exposure of the crater and avoidance of any surgical manipulations of the posterior duodenal wall.

Nissen's account of the surgery of recurrent jejunal ulcer is largely related to those cases which are a sequel to exclusion operations; and he stresses the point that excision of the excluded segment is still a prerequisite if further ulceration is to be avoided. Where the condition of the patient will permit, the desirable operation for such an ulcer will include removal of the pyloric antrum, closure of the duodenal stump, resection of the anastomotic ulcer with further gastrectomy, and reestablishment of a new stoma. Where such an operation entails undue risks, removal of the excluded segment with or without jejunal feeding for two months will sometimes obviate the necessity for further surgery.

Contrary to the usual practice of the English-speaking surgeons, Nissen advocates an entero-anastomosis in all ante-colic resections, and holds that the resultant absence of alkaline duodenal contents in the region of the main anastomosis does not increase the liability to subsequent ulceration.

As stated above, this is an intensely interesting study by a master of gastric surgery, and its contents should be known to every surgeon who aspires to cure a patient of his peptic-ulcer diathesis.

SYNOPSIS OF SURGERY.

THE twelfth edition of "A Synopsis of Surgery" has been produced despite wartime disturbances.¹ It is unnecessary to argue the merits and defects of synopses, but these are manifest in this production. If one wants a summary of the salient features of some important disease it can be found here. Most of the summaries are excellent and representative of solid English teaching. This book would be of value to those with a photographic type of memory who do not need to know the reasons for statements. In this book there is a noted absence of explanations. Perhaps these are out of place in a synopsis, but such omissions detract from its value; for example, in the discussion of the treatment of crush syndrome the physiological basis of treatment is not mentioned. This encourages "vain repetition" on the part of students. Many other instances of this kind could be cited.

Brevity may be the excuse for a dogmatism which is a universal and deplorable failing. That "ether is only rarely used as a sole anesthetic agent" is open to question. It may help the examination student to be given a rule of thumb, as in the treatment of fractured scapoid, but it would be better surgery for him to use his judgement, being guided by the X-ray appearance, as well as by the length of history. Experience with thyrotoxicosis makes most surgeons less and less inclined to group all cases into two varieties, primary thyrotoxicosis and toxic adenoma.

Proportion and correct emphasis are difficult to achieve. Yet it seems hardly appropriate to devote two-thirds of a page to burns and more than two pages to the operative

treatment of cleft palate, nearly two pages to hydatid cysts and a page to internal peritoneal hernia.

All textbooks which have taken a reasonable amount of time to prepare are in danger of being out of date by the time they are published. This book is at a disadvantage because there is only a very brief mention of penicillin which has so radically altered the outlook in surgery and medicine. It would appear to have been possible to incorporate more details of experiences with this form of therapy. Sulphonamide therapy is recommended frequently, but with rare mention of dosage, for example, in the treatment of erysipelas. This is important, and the precautions that must be taken are worthy of consideration. The use of sulphonamides has greatly reduced the instance of streptococcal septicaemia, and yet the statement is made that *Streptococcus pyogenes* is the causative organism in more than half the cases. There are several other statements which are out of date. In the discussion on aspepsia we read that the operator and all who have to speak must wear a mask while in the theatre. Surely it is time that the silent assistants wore one also. In a list of antiseptics, alcohol in the form of "surgical spirit" receives first mention and high commendation. Sulphonamides and penicillin are last on the list. "B.I.P.P." receives a mention and "Flavine" is recommended. Brandy is also given *per rectum* (perhaps justifiably). Thiourea and thioracil are not mentioned. One wonders how often avulsion of the phrenic nerve for pulmonary tuberculosis is done now. To us who do not see much tuberculosis of bone the classification of different types of caries as given appears antiquated and unnecessary. Intracranial hemorrhage is treated in the same old way with most emphasis on the extradural variety. Surely it is time that this fault was eradicated from textbooks. Non-specific urethritis is still incorrectly said to be rare.

Minor errors are always likely to occur in a comprehensive textbook, especially if prepared in a hurry. Nicola's operation is called "Nichol's operation". On page thirty Figures X and XI should be reversed. In the former it is obvious that the incision for infection of the sheath of the *flexor pollicis longus* muscle has cut the nerve supply to the thenar muscles. More important statements with which many would not agree are that the treatment of spondylolisthesis is by operation (no other treatment is suggested), that "regional ileitis" does not affect the caecum, and that up to twenty minims of Lugol's iodine are needed three times a day in the treatment of thyrotoxicosis.

Notes on Books, Current Journals and New Appliances.

THE DECORATION OF HOSPITALS.

RAYMOND SLOAN, in "Hospital Color and Decoration", has a lot of very new and interesting things to tell the reader on an interesting subject.¹ Writing in an informal style, the author takes the reader on a "conducted tour" through every section of a hospital, including quarters for medical, nursing and domestic staffs. Mr. Sloan rightly lays great stress on the therapeutic value of pleasant and cheerful surroundings; some of his proposals for private rooms, however, sound a bit too exuberant and too glamorous for the average Australian patient, and there is a slight shudder at the idea of a guardian angels and silver stars as wall and ceiling decorations in the nursery. His pages on colour and decoration in public wards are particularly good, and could be studied by the authorities of all hospitals where the bleak uniformity of an institution is the rule. He has many suggestions. Amongst many good ones, are his ideas on furnishing the entrance hall and waiting rooms to create favourable first impressions and to remove many of the patient's misapprehensions; the arrangement of coffee shops and small gardens; and the fitting of cubicle curtains running on rods hung from the ceiling to take the place of the clumsy screen. The author illustrates his points liberally with photographs and line drawings, but has failed to include one of the corridor. This he admits to be the "hospital stepchild" and a problem one, too, and here a photograph would have been of help. This book can be well studied, but Mr. Sloan's advice should be noted that the decoration of a hospital is a job for an expert, not an amateur.

¹ "Synopsis of Surgery", by Hey Groves, edited by Cecil P. G. Wakeley, C.B., D.Sc., F.R.C.S., F.R.S.E., F.A.C.S., F.R.A.C.S.; Twelfth Edition; 1945. Bristol: John Wright and Sons Limited. 7½" x 5", pp. 640, with many illustrations. Price: 25s. net.

¹ "Hospital Color and Decoration", by Raymond P. Sloan; 1944, Chicago: Physicians' Record Company, Sydney: Angus and Robertson Limited. 9½" x 7", pp. 272, with many illustrations. Price: 32s. 6d.

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All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

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Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

OVERSEAS TRAVEL FOR AUSTRALIAN STUDENTS.

In the course of an address delivered before the British Medical Association at Montreal in 1897 under the title "British Medicine in Greater Britain", the late William Osler said that in certain aspects the "Australasian Settlements presented the most interesting problems of Greater Britain". He used the following words: "More homogeneous, thoroughly British, isolated, distant, they must work out their destiny with a less stringent environment, than, for example, surrounds the English in Canada. The traditions are more uniform and of whatever character have filtered through British channels. . . . What the maturity will show cannot be predicted, but the vigorous infancy is full of crescent promise." That was nearly fifty years ago. Those who have lived in the world of medicine during this period have been rarely privileged; they have seen many discoveries and have watched their application in the fight against disease and the alleviation of human suffering; they have witnessed a reawakening in the value of research and its intensified pursuit in every branch of medical science; and unless they have been quite torpid, they have probably helped to bring about a widening of outlook and the placing of fresh emphasis on such aspects as the mental action and reaction in bodily disease and the varied problems of sociological medicine and other avenues of preventive medicine. This means that they have been taking a part in the evolution of science in relation to man, and this, it must be remembered, is bound up with the social evolution which is even now taking place, and has been in progress for the last few centuries. Osler pointed out that evolution advanced by such slow and imperceptible degrees that to those who were part of it the finger of time seldom seemed to move. Even the great epochs, he held, were seldom apparent to participants. None of those who have been engaged in the practice of medicine during the last fifty years can have failed to be conscious of its recent developments; they probably realized that the changes would be far-reaching,

but many could not or would not see them as part of an orderly evolutionary process. This last fact, incidentally, is one of the great difficulties in the making of plans for the future in either the medical or social sphere. Confining our attention for the moment to the sphere of medicine, we should probably be correct in the contention that development in what Osler called the Australasian Settlements has been much as he would have expected it to be. Osler spoke in Montreal, a city of two languages, French being spoken as well as English because so many of the people are French Canadians. The words "more homogeneous" applied to Australia are therefore justified. Medicine in Australia has also been thoroughly British—the early teachers in Australian medical schools were trained in Britain and they have left the British stamp on the Australian-born teachers who have succeeded them. The words "isolated" and "distant" do not apply with the same force today as they did in 1897. In the past if Australia did appear to be a step behind in the adoption of some scientific advance perfected in Britain, on the Continent of Europe or in America, the lag was probably occasioned by distance or isolation. During recent years distance has for most practical purposes been almost eliminated, but isolation is a potential danger and measures must continually be taken to guard against it. Isolation is not caused only by distance separating centres of activity or persons from one another; it may be the result of subtle factors of mind and possibly of habit.

In the pursuit of medical science, the student, that is, the practitioner, who cuts himself off from scientific collaboration and discussion with his fellows, however self-sufficient he may think himself to be, faces a life of deprivation and his atrophy must after a shorter or longer period of time become apparent. But there is another side to the picture. If we suppose that every practitioner makes the best possible use of his facilities for scientific advancement and that the medical community is united in its scientific endeavour, something will still be lacking. No scientific community can thrive in isolation, particularly if it is young; stimulating infusions from other scientific communities are needed from time to time. Stimuli may be received in various ways, but the one on which we wish to lay stress is the paying of visits to other countries by individual practitioners. In the early days of Australia medicine was indeed "thoroughly British". Australian medicine is slowly building up its own tradition, but it is still largely influenced by British medicine and the influence has been to a great extent absorbed by individual practitioners in their individual comings and goings rather than by groups of persons. Central Europe and latterly America have also attracted the medical traveller. While on the one hand it has for many years been almost looked on as essential for a practitioner to study on the other side of the world if he wished to specialize in a particular branch of medicine, sound arguments have lately been advanced in favour of the provision of means by which special skill may be acquired within the borders of the Commonwealth. This is a condition which should be made possible for all the specialties. It would, however, deprive the future specialist of the enormous benefit that can be gained from overseas travel and study. In any case practitioners other than would-be specialists are no different from the latter in their ability to benefit in this way. In the past medical practitioners seeking to enlarge their experience overseas have had to

travel at their own expense and in many cases have had to save from their earnings to gain the money needed. At the present time with the high cost of living and the excessive burden of taxation it appears that very few practitioners will be able to save for this purpose and the only people able to spend time at clinical schools in the old seats of learning will be those possessed of inherited wealth. If this state of affairs does arise it will be a serious loss to individuals, but this loss will be thrown back onto the community—the community always suffers in the long run if anything is allowed to happen which lowers the efficiency of its servants. There are several ways in which the situation may be met. One would be by the making of reciprocal arrangements with teaching hospitals in Great Britain and America for the establishment of resident posts to be held for a period by overseas graduates. Another method that might be considered would be the creation of travelling fellowships by the extension of the present scheme by which the fees of certain students with living allowances are met by the State, the students most likely to profit being selected after exhaustive inquiry into every aspect of their qualifications and attainments. Some young graduates might be able to find appointments overseas if nothing more than the cost of travelling was provided. The travelling fellowships established by the Nuffield Foundation, the Rockefeller Foundation and the Carnegie Trust, and advertised recently in this journal by the National Health and Medical Research Council, are valuable, but they cover only a short period and are intended more especially for those likely to be engaged in clinical teaching.

Medicine is not the only sphere in which the provision of overseas experience for young Australians will be useful to Australia in the future. The Chancellor of the University of Melbourne, writing in the *University Gazette* of May 24, 1945, outlined a proposal for the establishment of travelling scholarships between universities in Britain, America and Australia as a means of dispelling the ignorance displayed by the people of one country of the ways of life and thought of another. He holds—and many will agree with him—that this ignorance is one of the causes of international misunderstanding. If the world is to live at peace in the future, the peoples of the different nations will need to understand and to trust one another. Australia has seen a good deal of American and British service men during the last few years. The friendships that have been made, the trust that has been engendered, are worth fostering. The Chancellor mentioned the design of Cecil Rhodes who founded the scholarships known to all Australians. He thinks that a somewhat similar design might be adopted by Britain, America and Australia. This is a statesman-like suggestion that should be given serious consideration by the Commonwealth authorities.

On the medical side we think that a body such as the Federal Council of the British Medical Association in Australia should appoint a subcommittee to report on the matter. When this has been done, the question will have to be further pursued. It is really part of post-graduate education and both it and the proposal made by the Chancellor of the University of Melbourne ought to be dealt with when other post-war educational matters are considered. On a previous occasion we expressed the opinion that a Royal Commission on Education should be constituted as a post-war measure; the time is ripe for this to be done.

Current Comment.

THE PREVENTION OF INFLUENZA.

THE threat of epidemic disease has throughout the ages followed in the wake of war. Indeed as Zinsser writes: "Armies have crumbled into rabble under the onslaught . . . of dysentery and typhoid bacilli"; so that in the technique of what we are pleased to call "modern" warfare, the anticipation and prevention of infection are logical contributions to victory.

Early in the war the Office of the Surgeon-General United States Army set up in its Preventive Medicine Service a Commission on influenza under the direction of Thomas Francis, junior, and a comprehensive plan was developed for the field trial of vaccination against influenza, in which use was made of the large aggregation of young adults in training centres under reasonably controlled conditions. It was decided to rely on a single injection of concentrated material, timing the inoculations as far as possible to precede an expected outbreak, and to inject alternate subjects with control material of similar volume. The centres of investigation were in Minnesota, Iowa, California, Michigan and New York, and each team of workers have assembled and recorded their results.¹

The vaccine was prepared from standard strains A and B, and the A virus was composed of equal amounts of strains PR8 and Weiss. The latter was a recently isolated strain from an apparently sporadic case in 1943, and was included in the hope that it might more nearly resemble strains likely to be infective in the community, also because it had been found that it produced good antibody response. Each dose of 1.0 millilitre contained concentrate from 5.0 millilitres of allantoic virus B, and 2.5 millilitres each of PR8 and Weiss, and was injected subcutaneously. Vaccination was carried out in the different centres between October 19 and December 4, 1943, and washings were taken and cultivated for virus during the period; every tenth subject was bled at intervals of ten days, for antibody titre, and in some cases three months later. Virus was first isolated on November 17, although serum antibody rises had indicated that virus was in the various communities earlier, and about this time a sharp rise in the general incidence of respiratory disease was also noticed. In all groups a total of 5,989 persons were vaccinated, and 5,923 received the control injection.

The overall results showed that the incidence of influenza amongst the inoculated was 2% and amongst the controls 8%, so that the vaccine had appreciably affected the incidence of the disease, showing a protective influence from the single dose given roughly eight days before the disease became noticeable. The tests on paired sera from control subjects showed that while there was evidence of influenza A in the community, only in a single instance in the New York series was there a rise in B virus titre of antibody, and no B virus was isolated during the course of the investigation. Findings in the different centres vary, and it is interesting to compare them. In Iowa, where the whole programme of vaccination was not complete when cases began to occur, the incidence amongst controls was five times that amongst the vaccinated, while in California, where six weeks elapsed, the controls showed only twice the incidence shown by the test subjects; here a strain of virus isolated during the epidemic, "Olson", was used as antigen for the haemagglutination tests, and the antibody demonstrated by its use was a much lower titre than that towards PR8 and Weiss. These diagnostic isolations of virus were carried out by the amniotic method, and in view of the recent demonstration by Burnet and his co-workers of the differences in reactivity in "O" and "D" virus, there may be an explanation of this result.² In Minnesota note was taken of the finding that in a vaccinated subject whose paired sera had shown good antibody rise, the later

¹ *American Journal of Hygiene*, July, 1945.

² *The Australian Journal of Experimental Biology and Medical Science*, June, 1945, page 151.

occurrence of clinical infection, proven by virus isolation, did not stimulate further antibody response.

The associated rise of winter respiratory infections was carefully watched; β -hemolytic streptococci made their appearance, but did not influence the influenza group in any detectable way, while of 11 patients in New York classified as suffering from atypical pneumonia, seven showed definite evidence of influenza A, and were all control subjects, suggesting that the virus could produce pneumonia. The duration of immunity as measured by antibody response was tested as far as practicable up to four months after inoculation, and although there were exceptions, the general level of antibody remained higher than that initially found. As is well known, the subjects with lower antibody showed better rise after inoculation but the level fell again; those with higher antibody level showed less response and less fall.

In the thoughtful discussion contributed by G. K. Hirst and his group¹ it is suggested that the relation of serum antibody and resistance to clinical influenza needs further explanation, and they point out that an increase in the general attack rate would in all probability minimize the value of vaccination. Moreover, the good result obtained in the centre where cases began to occur eight days after completion of the programme indicated a possible optimum time, a finding which could be made useful in further experiments.

In Australia the constant flow of experimental evidence on influenza virus from the Walter and Eliza Hall Institute provokes a keen interest in the results of this large scale experiment. Professor Burnet suggests that the local implantation of virus on the respiratory mucosa may well be an explanation for the lack of influence of high antibody titre. According to this suggestion, the virus becomes attached to the susceptible cell from the situation where the least possible antibody effect can be produced. At the same time his recently described technique to differentiate virus in the "O" phase from the derivative phase of established laboratory strains—difference in haemagglutination of fowl and guinea-pig red cells and inability to infect the allantoic cavity—may call for revision of the significance of methods of primary isolation of virus. The usefulness of the practice of giving a single dose of concentrated vaccine to susceptible age groups assembled as in army training camps, however, seems to be well substantiated by the results recorded here.

"THE STEVENS-JOHNSON SYNDROME."

IN 1922, A. M. Stevens and F. C. Johnson described "a new eruptive fever associated with stomatitis and ophthalmia".² They reported two cases. The earliest symptoms were weakness, and soreness of the mouth and eyes. In a short time purulent conjunctivitis became apparent, and on the third day reddish spots appeared on the back of the neck. The eruption spread until only feet, hands and scalp were free of it.

The trunk, arms and thighs were thickly set with discrete, oval, brownish purple papular lesions, varying in size from 0.5 to 2 cm. in the longest diameter. A few of the largest spots showed a yellowish, dry, necrotic center. There was no vesicle nor pustule formation; no induration about the papule; no areola and the skin between the lesions seemed to be perfectly normal. The forearms and legs showed what seemed to be the more recent lesions. These were less raised, of brownish color, paling somewhat on pressure, and more closely set than were those of the trunk and thighs.

The lips were cracked and bleeding and encrusted; the tongue was swollen, bright red and fissured; and the buccal mucous membrane was "inflamed with small bullous lesions which rapidly broke down, leaving a raw and angry surface". The eyelids were oedematous. Thick pus streamed from the palpebral fissures. One patient was blinded; the

other was left with a corneal opacity. One patient's spleen was palpable. It is of interest to note that his tonsils had been removed a few months previously and that he had been in hospital for fourteen weeks thereafter suffering from fever and splenomegaly and that *Staphylococcus aureus* had been cultured from the blood. The course of the illness was that of a severe and protracted fever. The leucocyte count was low at the height of the illness. In one case a pure culture of *Staphylococcus aureus* was obtained from a necrotic lesion. No other significant bacteriological findings were recorded. Stevens and Johnson presented strong arguments in favour of their view that it was a separate clinical entity. Since their report a number of cases have been recorded under such names as "*erythema multiforme bullosum* with involvement of mucous membranes of eyes and mouth", "*erythema multiforme exudativum* with ophthalmia and stomatitis" *et cetera*. The latest report comes from Simon Kove, a medical officer of the United States Army.³ His two patients were young men. The first suffered from membranous stomatitis, purulent conjunctivitis and inflammation of the urethral meatus; but he had no exanthem. Sulphadiazine was given early. The temperature subsided by lysis and reached normal by the sixth day. The oral mucous membrane had sloughed away by the tenth day, and by the seventeenth day the mouth was normal. The ocular discharge ceased on the seventh day; but conjunctivitis persisted till the seventeenth day. The second patient's illness was severer and more prolonged. It commenced with parotitis. Numerous vesicular and erythematous lesions appeared. Sulphadiazine and penicillin were given. In each case the leucocyte count was raised (10,000 to 14,000 per cubic millimetre) at the commencement of the illness, but remained below 10,000 thereafter, and in the second case was as low as 5,800. Kove, bearing in mind the second patient's mumps, suggests that a virus may be the causal agent.

The main and possibly the primary lesions in this syndrome are stomatitis and conjunctivitis. The exanthem appears to be secondary; possibly it occurs only when infection of the blood stream is heavy. Perhaps the early administration of sulphadiazine was sufficient to limit it in Kove's cases. Oral and ophthalmic surgeons and dermatologists should be on the lookout for the disease. Possibly it is not so rare as we have been led to believe.

A NEW YORK Festschrift.

THE issue of the *Journal of the Mount Sinai Hospital*, New York, for May-June, 1945, is dedicated to Dr. Eli Moschowitz on his sixty-fifth birthday. It is said of Dr. Moschowitz in a foreword that no member of the staff of the Mount Sinai Hospital in this generation has commanded the respect and devotion of his associates in quite the same degree, and he is described as "physician, scientist, scholar, traveller, epicure, bibliophile, magician and lover of music and the arts". He has been a prolific and versatile writer in the field of clinical medicine. His monograph on the hyperkinetic diseases was the subject of comment in this journal on February 26, 1944. Dr. Moschowitz's latest monograph on "The Biology of Obesity" might well have application to the special number of the *Journal of the Mount Sinai Hospital*, for instead of the usual slender publication it is a stout volume of 814 pages. It is "healthy fat", however, and may well give much pleasure to the recipient. Among many interesting contributions are articles on cup-shaped nipples as a stigma of infertility, by R. T. Frank; on the continuous immobilization of the chest and diaphragm in the treatment of pulmonary tuberculosis, by A. L. Barach; on the relationship of the *arcus senilis* to coronary arterial disease, by E. P. Boas; on the Kenny treatment of poliomyelitis, by A. E. Fischer; on the pathogenesis of atherosclerosis, by L. N. Katz and D. V. Danber; and on a homunculus discovered in a dermoid cyst of the ovary, by A. Plant. There are 75 articles in all.

¹The *Journal of the American Medical Association*, Volume CXXIV, 1944, page 982.

²American *Journal of Diseases of Children*, December, 1922.

³The *American Journal of the Medical Sciences*, November, 1945.

Abstracts from Medical Literature.

SURGERY.

Total Removal of the Pancreas and Other Organs and Tissues.

A. BRUSCHWIG, J. T. RICKETTS AND R. R. BROWLAW (*Surgery, Gynecology and Obstetrics*, March, 1945) report a case of total pancreatectomy, total gastrectomy, total duodenectomy, splenectomy, left adrenalectomy and omentectomy in a diabetic patient, with recovery. The patient was a white male, aged fifty-three years, who was seen first in February, 1944, and was complaining of steatorrhea, loss of weight and polyphagia. After examination it was decided that he was severely diabetic, and it was found that he required 60 to 90 units of insulin daily. Under treatment he regained 37 of the 50 pounds in weight which he had previously lost. X-ray examinations of his alimentary tract revealed no abnormality. He was discharged from hospital in May, being readmitted three months later with jaundice and right upper abdominal pain. Exploratory laparotomy was performed in September, 1944, and a carcinoma was found in the body and tail of the pancreas, with extension into the stomach and left adrenal gland, and numerous metastases in the greater omentum. The omentum was resected first, and then the stomach, duodenum, pancreas, spleen and left adrenal. Oesophago-jejunosotomy and choledochojunosotomy were performed. An entero-anastomosis was carried out. The operation was performed in five hours and forty-three minutes, during which time the patient received 2,800 millilitres of blood, and 300 millilitres of saline and 800 of gelatin solution. It is stated that there was no shock at any time, and that the post-operative course was smooth. Details of the management are given. The pancreas when examined showed degenerative insular changes typical of diabetes, and carcinoma arising from duct epithelium. The patient was ambulatory ten weeks after the operation, but then developed metastases within the abdomen and died one month later.

The Use of Heparin in the Abdomen.

F. M. MASSIE (*Annals of Surgery*, April, 1945) discusses the intra-abdominal use of heparin in the prevention of peritoneal adhesions. He first reviews the work of Lehman and Boys. These investigators administered heparin before closing the abdomen after dividing adhesions, and then by paracentesis every twelve hours for three days; results in fourteen patients were reported. The author has tried a modification of this method in seven cases. All patients had shown a tendency to reform adhesions in number and density far above the average, and to develop intestinal obstruction. He thinks that heparin seems to offer a better outlook in this type of condition than anything used up to now, but quotes and endorses the view of Lehman and Boys, that "the use of heparin should be limited to cases of obstruction due to adhesions, and particularly to cases in which previous

operations have been performed for obstruction; in other words heparin should be used only in that group of desperate cases in which one is willing to accept the hazard of an insufficiently tried method in preference to a future risk of significant proportions". The one important and essential contraindication is the presence of an oozing peritoneum after adhesions have been divided, and heparin should not be used when granulation or subacute inflammatory tissue is present. Minor dangers attending the use of heparin are infection and delayed wound healing, but the chief danger is hemorrhage. Blood coagulation and bleeding time should be estimated, but the author has obtained better guidance from clinical observation, together with estimations of blood pressure and hemoglobin. Should hemorrhage occur, it can be checked by blood transfusion and by discontinuance of the heparin, but this will mean abandoning the attempt to prevent the reestablishment of adhesions. The author reports seven cases in which heparin was used intraperitoneally.

Succinylsulphathiazole and Phthalylsulphathiazole in Colon Surgery.

E. J. POTH (*Surgery*, June, 1945) discusses the value of succinylsulphathiazole and phthalylsulphathiazole (referred to briefly as "sulphasuxidine" and "sulphathalidine") in the preparation of the colon for surgery. Both drugs lower the count of coliform organisms in the faeces very considerably, but there are some differences between the two drugs; the former will reduce the count to about 100 organisms per gramme of faeces, and cause the stools to become semifluid, small in bulk, mucoid and relatively odourless. Sulphathalidine is more effective in reducing the colonic flora, but the faeces become tenacious and stringy, and there is less efficient mechanical emptying of the bowel unless enemas and purges are used. Sulphathalidine is the more effective drug in the presence of diarrhoea. Average dosages are 3.0 grammes every four hours for sulphasuxidine and 1.5 grammes every four hours for sulphathalidine. Among several thousand patients there has been one fatality, which was due to agranulocytosis. Some minor toxic effects are described, and the author points out that there is a possibility, through misunderstanding, that the patients may be given sulphathiazole when succinylsulphathiazole has been ordered. The larger dosage renders such an error dangerous. An occasional patient with an ulcerating condition of the colon shows an increased tendency to bleeding while being prepared with sulphasuxidine. For routine pre-operative preparation a saline purge is first administered and the patient is then put on a diet with a high protein content and a low residue. One or other of the drugs is given, in the dosages mentioned above, for a period of seven days. If an anastomosis has been performed, the drug is continued after operation. Poth concludes that sulphasuxidine and sulphathalidine help to bring about a satisfactory bacteriological and mechanical preparation of the bowel for surgical operation. With the proper alteration of bacterial flora, the preservation of blood supply by the avoidance of tension and the proper

placement of sutures become more important than the chance soiling of tissues by the modified contents of the bowel. The drugs, when properly used, contribute to a lowering of operative mortality, and make an occasional procedure possible which might otherwise not be feasible.

Local Treatment of Burns.

E. C. REESE (*The American Journal of Surgery*, March, 1945) reports his experiences in the treatment of 33 cases of burns. Local treatment consisted of the application of a transparent film with a methylcellulose base, and containing 20% of sulphamillamide and 10% of sulphacetamide. Before application of the film the burned area was cleansed with neutral soap, strict aseptic precautions being observed. Pressure dressings were applied over the film, and were removed after four or five days to permit inspection of the burn through the film. The film was not removed until healing was complete, unless any portion had become macerated. This was then replaced by new film. General supportive measures were also employed. The author found the results were satisfactory and the patients very comfortable. He considers that the method is deserving of wider use.

The Causation of Shock.

DALLAS B. PHEMISTER AND CARL H. LAESTAR (*Annals of Surgery*, June, 1945) discuss the causation of surgical shock. Working on the theory that nerve stimuli from the site of injury or operation produce shock, they have made attempts to prevent shock by nerve block. Swingle and his co-workers deduced that a flow of nociceptive nerve stimuli from an area subjected to trauma played an important part in the production of shock, and that if spinal anaesthesia was used the incidence and severity of shock were greatly reduced. The authors refer to a series of experiments on dogs by Swingle and his co-workers, designed to test theories as to the effect of trauma in producing shock. The animals were anesthetized with ether, and then a 2% solution of procaine was injected at the level of the third or fourth lumbar vertebra, the amount varying with the weight. Both hind legs were subjected to trauma with a mallet, after which the ether was withdrawn and the spinal anaesthesia continued. The authors arranged a further series of experiments to determine how much of this reported protection against limb trauma was due to blockage of sensory nerves preventing the flow of presumable nociceptive stimuli from the field of trauma and how much due to the block of vasomotor and motor nerves with resultant temporary fall in blood pressure reducing the amount of hemorrhage. The technique of the authors' own method is described and detailed tables of the results are set out. No evidence was obtained from these limb trauma experiments either that a flow of nociceptive stimuli from the injured field or that toxin formation is an important contributing factor in the initiation of any circulatory impairment or shock which followed. The animals in which the trauma was applied soon after the administration of spinal anaesthesia were protected from shock principally by the blockage of the vasomotor and motor nerves, which

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greatly lowered the blood pressure and limited the hæmorrhage to an amount that was too small to produce shock, instead of by the blockage of afferent impulses. The maintenance of such a low blood pressure by spinal anaesthesia for the prevention of shock during an operation on man is contraindicated, as the amount of anaesthesia required would be too great. In all of the experiments in which shock developed, the local blood loss was large and constituted the outstanding causative factor. There appears to be no indication for the renewal of efforts to prevent shock by the blockage of afferent nerve impulses through the use of local or spinal anaesthesia. Indications for the use of local or spinal anaesthesia in shock are based on other grounds.

Prophylaxis of Wound Infection.

L. W. PETERSON (*Archives of Surgery*, April, 1945) discusses methods of cleansing wounds as set out in medical literature. Believing that the germicidal properties of soap are unquestionable and that the irritative properties of soap in wounds are neither great nor damaging, the author conducted a series of experiments to establish the superiority of soap and water over other means of cleansing wounds. He allowed a culture of pyogenic organisms to remain in the wound for a definite time; the effects of mixtures of green and white soaps, the effects of scrubbing, the combined effects of scrubbing and soaps and the effects of irrigation with isotonic saline solution were studied. Photomicrographs of biopsy specimens after the various treatments illustrate the article. There is no doubt as to the efficacy of the various soaps as germicidal agents. However, in these experiments, when the soaps were placed in actual contact with the uncontaminated fresh wounds, they produced a definite but slight irritation. This was noted only on microscopic examination; gross examination revealed no difference between control wounds and wounds into which soap had been placed. However, in wounds which were contaminated by a given amount of a culture of *Staphylococcus aureus* placed within their depths and then exposed to soap, there was definite increase in signs of infection over those found in the control wounds not exposed to soap; "green" soap was found more irritating than "white" soap. The harmful effect of mechanical washing of the wounds is in direct proportion to the coarseness of the material used. These experiments indicated that of the various methods studied, the cleansing of contaminated wounds by a gentle irrigation with isotonic solution of sodium chloride is the most effective prophylaxis of wound infection. Contaminated wounds treated by this gentle irrigation healed with less evidence of infection than did control contaminated wounds subjected to no treatment other than closure at the specified time. Best results were obtained by irrigating the wounds with 1,000 millilitres of saline solution with no scrubbing, but with the force of the stream used as the washing mechanism.

Acute Pancreatitis.

JOHN MORTON (*Surgery*, April, 1945) deals with the need for rapid diagnosis of acute pancreatitis. He emphasizes

the value of Somogyi's rapid method of estimating the amylolytic activity of the blood amylase; this test may be reported upon in twenty minutes. The test measures the reaction time, not the reducing power, of the blood diastase. Under normal conditions the pancreas, salivary glands and liver do not contribute to the blood diastase level, but acute pathological changes in the pancreas or salivary gland may cause a temporary effusion from these glands into the blood stream. Aspirated fluid from the peritoneal cavity is useful, and in acute pancreatitis gives high readings. Acute pancreatitis can be diagnosed only very rarely without the blood amylase test. The author quotes a series of diagnoses ranging from perforated ulcer, cholecystitis, empyema of the gall-bladder, to the acute crisis of pernicious anaemia; in all these cases improvement could have been effected by the application of the test. He states that acute pancreatitis must be considered in all cases of sudden severe epigastric pain. The serum amylase test is of the greatest value in deciding if the pancreas is involved. There are two distinct types of acute pancreatitis, acute oedematous and pancreatic necrosis. Acute oedematous pancreatitis can be diagnosed by the serum amylase test and the rapid improvement under conservative treatment. Pancreatic necrosis must be suspected when the patient fails to make improvement within a few days. In acute oedematous pancreatitis operation should be deferred until the reaction has subsided. Acute oedematous pancreatitis is followed by chronic pancreatitis frequently, as is demonstrated at late operation. Pancreatic necrosis is followed in a proportion of those who survive by abscess, diabetes and pseudocysts. Conservative treatment of pancreatic necrosis or pancreatic abscess is disastrous. When diagnosis of either condition is suspected, operation is indicated as soon as the patient can be properly prepared for it. Biliary tract disease should be treated after acute pancreatitis if it has played a part in the onset. Any surgical manipulation about the lower end of the common bile duct or the head of the pancreas is likely to be followed by post-operative acute pancreatic oedema. This can be demonstrated by the amylase test. There is a considerable danger of this in the resection of posterior duodenal ulcer perforating into the pancreas. It carries a mortality which should be taken into consideration in any series of duodenal ulcer resections. The author's case reports were selected to illustrate points made in this discussion.

Dermoplasty of War Wounds of the Lower Part of the Leg.

J. F. PICK (*The American Journal of Surgery*, July, 1945) describes a method of covering areas denuded of skin after excision of diseased soft parts and bone. The author claims that eight to ten months' time is gained in the management of severe injuries of the lower part of the leg and that the results are better from the functional, anatomical and cosmetic points of view. The basis of the method is the combination of the double pedicled flap, with a reduction in the circumference of the leg, and the secondary use of full thick-

ness skin over the small residual surgically created area. The method is applied to the management of compound fractures of the leg by the open method. Great care is taken in the pre-operative treatment by means of scrubbing and irrigation with Dakin's solution coupled with packing, keeping the wound moist, and the use of general measures to produce an aseptic field. The first step in the author's method consists in taking an exact copy of the defect by means of an X-ray film cleaned of its sensitized coat. After it has been cut accurately on the wound surface, the pattern is turned to one side or the other to see which offers the best tissue. The whole of the affected soft parts are then excised, care being taken to avoid disseminating any of the debris into the surgically uncontaminated areas around and underneath. Any bone protruding into the wound is excised with the soft parts to avoid leaving excrescences under the flap. This may leave a very deep defect quite unsuitable for ordinary skin grafting. It is of no consequence that only tendons and bone appear in the bottom of the wound. An important and necessary step in cutting the flap by a single incision approximately parallel to the long axis of the limb, is to cut only half-way through the fat, and then to separate the fat into two layers. This separation is carried out by sharp dissection under the whole of the flap and under its upper and lower extremities. The fat remaining is now fashioned into fat pedicle flaps to cover the underlying bone and tendon *et cetera*. The double pedicled flap is now moved over the defect. To reduce the new raw surface produced by moving the flap, the author sacrifices some of the undisturbed fat over the muscles. In two of the author's cases the whole of the lower part of the leg was stripped of fat, so that it was possible to close the wound without any subsequent skin grafting. The areas left on each side of the flap are then covered with full thickness grafts. Two punctures are made in the skin to permit drainage from the most dependent part. The dressing is done by covering the whole area with 3% scarlet red ointment; over this is placed a layer of cotton wool moist with saline solution, and over this dry cotton wool. Care is taken not to apply too much pressure. The leg is elevated and the whole dressing is left undisturbed for fourteen days.

The Metabolic Changes after Burns.

J. W. HIRSHFELD *et alii* (*Archives of Surgery*, April, 1945) report the results of the investigation of loss of nitrogen by 23 burned patients. The intake was carefully compared with loss by way of vomitus, faeces, urine and wound exudate. All patients excreted large quantities of nitrogen in the urine, and, except for a few who received large quantities of carbohydrate and protein, lost considerable weight. It was possible to prevent or to decrease a negative nitrogen balance by feeding with diets high in calorific value and protein content. These diets, however, were poorly tolerated during the first few days after injury. Most burned patients suffer from anorexia and will not consume an adequate diet, hence after the stage of shock has passed special care must be taken to ensure that they eat sufficient food to maintain proper nutrition.

Medical Societies.

OBSTETRICAL SOCIETY OF THE WOMEN'S HOSPITAL, MELBOURNE.

A MEETING of the Obstetrical Society of the Women's Hospital, Melbourne, was held on May 16, 1945, at the hospital, Dr. ELLIOTT TRUE in the chair. The meeting took the form of a symposium on the conduct of labour by members of the obstetrical staff of the hospital.

Symposium on Labour.

Uterine Pains in Labour.

Dr. W. I. HAYES discussed pains in labour. He said that labour was the extrusion of the child from the uterus and vagina until its complete expulsion into the outside world. When this was progressive and effected by a succession of normal uterine and abdominal contractions, the labour was normal, even though an abnormal presentation or fetal mechanism might be present. It was important to realize that there was an intimate relationship between the pains and the progress of the child. When progress was normal, the pains were normal, and conversely, when pains were normal, normal progress was taking place. Thus, there were two criteria by which a labour might be judged—first, the progress of the child, and secondly, the pattern of uterine activity; but of the two, the latter was the more delicate, became evident earlier, and was therefore the more important.

Dr. Hayes then said that uterine contractions during labour varied in rhythm, in duration, in intensity and in character, according to the stage of labour at which they occurred. Each contraction slowly increased to an acme of height, which was maintained for a certain time, and then the contraction slowly subsided. During the stage of taking up or shortening of the cervix, the pains lasted three to five seconds, recurred at intervals of fifteen minutes to one hour, and were usually felt solely in the abdomen; but during the stage of cervical dilatation, the pains lasted twenty to twenty-five seconds, recurred every three to five minutes, and beginning in the back, passed round to the front. In the second stage of labour, the stage of descent or expulsion, the uterine contractions lasted forty to fifty seconds, recurred every five to seven minutes, were typically "bearing down" in character, and were assisted by voluntary contractions of the abdominal musculature. In every case, the labour pains should be studied from time to time, to determine whether they conformed to the normal pattern. The patient must be asked to notify the onset of a contraction, the uterus should be palpated, the demeanour of the patient should be closely observed, the duration of the complete contraction should be ascertained by timing with a watch, and then the onset of the next contraction should be awaited, so that the interval between pains might be known. If the patient was in a certain stage of labour, and had the type of contraction corresponding to that stage, then the labour was normal and normal progress was taking place; but if the pains characteristic of one stage occurred outside that stage—for example, if second-stage pains appeared before the cervix was almost fully dilated, or first-stage pains occurred during the stage of expulsion—then the labour was abnormal, and progress was not taking place. Except in the rare instance of true uterine inertia, the character of the contraction always reflected the progress of the child against the resistance offered to it by the pelvis and birth canal.

Dr. Hayes went on to discuss abnormal labour pains, in contrast with those of normal labour. He said that true uterine inertia, the cause of which was still unknown, was attended by infrequent, short, weak and ineffective contractions, which were present throughout all stages of the labour. Primary uterine inertia was due either to a reflex spasm of the circular muscle of the cervix, from apprehension or fear, or to lack of pressure by the presenting part on the internal os, as in disproportion, full bladder, *placenta previa et cetera*. In each case, the pains at the onset of labour were vague, infrequent and irregular. Secondary uterine inertia, though usually but erroneously thought to be the result of uterine fatigue, was initially due to obstruction to the child's progress. Hyperactivity of the uterine action, giving rise to contractions which were stronger, longer and more frequent than normal, and which were likely to lead to a state of impending rupture of the uterus, was also the result of obstruction; but in this case, the child was attempting to pass through a partly dilated cervix, and this

provided the stimulus which intensified the forces of labour. In precipitate labour, the contractions during the first stage gave rise to little or no pain, and the acceleration of the second stage followed from a combination of reduced resistance with an overwhelming desire to bear down. In conclusion, Dr. Hayes said that for many years the mechanical factors of labour had been unduly stressed at the expense of the physiological factors. It was hoped that, in future, more attention would be paid to the latter, and that their importance would be more fully appreciated.

The Progress of Labour and Palpation.

Dr. J. W. JOHNSTONE said that he wished to turn attention from the physiological forces of labour, or engines of delivery, to the purely mechanical side—how the fetus was moving along the birth canal, and the clinical determination of the progress of labour by external palpation.¹ Except in cases of gross cephalo-pelvic disproportion, it was not possible to predict the outcome of labour until the process was well established. In the complex physiological mechanism of labour, the uncertain factors were the strength of the pains, the relaxation of the pelvis, the moulding of the head, the altered disposition of the soft parts, and the physical and mental fortitude of the patient. Although preliminary warning signals of impending disaster might be present, every labour became more or less a test of labour. As Hippocrates himself had said: "Experience is fallacious and judgement difficult." Dr. Johnstone pointed out that the putting of the foetal head through the pelvis had not the same mathematical precision as the passing of a marble through a wedding ring, in which case it went through or it did not. The pelvis itself was moderately fixed, but by no means circular. The all-important plane of the inlet was inclined at 55°, with the forward-projecting but inaccessible promontory not much below the navel, so that the head passed down and back into the bed. Although buried in the substance of the *mons Veneris* and obscured by the origin of the rectus muscle, the *symphysis pubis* was the outstanding landmark on palpation of the pelvic brim. Its sloping surface formed the whole anterior wall of the bony pelvis. It was the arch or bridge under which the head must ride. Dr. Johnstone, referring to the foetal head, pointed out that this was unlike the marble, in that it was compressible in substance and ovoid in shape. The general contour of the occipital pole was spherical, the sub-occipito-bregmatic and biparietal diameters each being three and three-quarter inches. Projecting forward out of this occipital sphere, and lagging behind it in the flexed head, was the sincipital sphere, slightly less in diameter. The main art in obstetrics was to estimate the disposition of this ovoid body with respect to the sloping upper pelvic strait. Some would say that this was about as satisfactory as playing snooker on a tilted table and using elliptical billiard balls.

The terms "attitude", "lie", "presentation" and "position" of the fetus relative to the mother were familiar to everyone. Dr. Johnstone said that he wished to draw attention to another relationship, even more important but not so generally understood. This was first described by Müller as the station of the fetus—the level of the presenting part, its degree of engagement, how far it had descended on the curve of Carus—in other words, its relationship to the symphysis. It was usual to speak of a floating head when the head was freely mobile above the inlet. In the *multi-gravida* the head often remained high until the cervix was well dilated and the membranes ruptured. When present in a *primigravida* at the onset of labour, floating head was a warning signal of possible disproportion, as lightning and fixity usually occurred some weeks before. The head was said to be becoming fixed when moderate pressure would not displace it, but the biparietal diameter had not yet passed the region of the inlet. It was engaged when its greatest horizontal plane, passing through the parietal bosses, had passed the plane of the inlet.

Referring to palpation, Dr. Johnstone said that one had to ask what landmarks there were on the fetus by which descent could be judged. Descent of the foetal head sounds provided only a vague and unreliable estimate. The anterior shoulder was the only point sufficiently defined on the foetal body to be used as a landmark. When the head was completely above the brim, it was four or five inches over the pubis, and when fully engaged it was about two inches above the pubis. After anterior rotation it approached the mid-line while descending. It was the foetal head, however, that provided the main estimate of descent and disproportion, and the methods used were the first and second pelvic grips

¹ Dr. Johnstone's discussion was illustrated by a number of lantern slides.

and their modifications. In performing the first pelvic grip, it was best to begin by palpating the *symphysis pubis* and its upper margin. The ulnar border of the right hand was then placed on the pubis and a wide grasp of the head was taken in the spread hand. Its ovoid contour, with the forward-projecting and upward-lagging sincipital protuberances, was determined. This sincipital pole would lie to one or other side of the pelvis and to the back or front according to position. In the flexed head the sinciput was the last to disappear, and in posterior positions its projection forwards over the pubis was likely to lead to an erroneous diagnosis of disproportion. This first pelvic grip of Pawlic could also be used to determine fixity, by rocking the head from side to side. Again, by reversing the grip and holding the head down on the brim with the left hand from above, it was possible to estimate overhang over the pubis. The second pelvic grip was performed by turning to face the patient's feet, and by sinking the fingers into the iliac fossæ, it was possible further to palpate and outline the head and to rock it from side to side, in or over the brim. The grip could also be modified, as described by Müller and by Windeyer, to determine disproportion and overlap. If the head was pushed down onto the pubis and back onto the promontory, a "sighter" could be taken with the fingers from the most forwardly projecting portion of the head onto the pubis. It was well again to remember the inclination of the brim, and to recollect that the head therefore went down and back into the bed. When the sinciput had disappeared from deep palpation in the iliac fossa, one could begin to feel for the emerging head by deep palpation through the soft tissues of the ischio-rectal fossa lateral to the vulva. In the labour ward post-anal palpation was preferred. The patient was turned on her left side and the parts were covered with a towel, and during a contraction the fingers were pressed slowly and deeply into the tissues behind the anus and in front of the coccyx. When the firm resistance of the head could be felt from below, the end of labour was usually in sight. Later the perineum would bulge during a contraction, the anus would begin to open, exposing a length of its red anterior wall, and then the hairy scalp would part the pillars of the labia as the head was crowned.

Dr. Johnstone said that by using these methods of external palpation, which could be often repeated and carried no risk, it was possible to determine the clinical progress of labour, and in most labours to dispense with internal examination. While undoubtedly vaginal examination provided much additional data, particularly with regard to the dilatation of the soft parts, in normal labour vaginal examination should be resorted to only when there was doubt about continued advance. The important question of what was the station of the head had to be asked many times in every labour—such questions as how much of the head was still above the pelvic brim, had the critical point been reached, and whether the parietal bosses had passed the *conjugata vera* with the lowermost level of the head at the ischial spine plane. It was this ability to recognize the changing station or progressive descent of the head which constituted a great part of obstetrical art. Conversely, it was the inability to recognize the lack of advance in spite of good contractions which distinguished the blind midwife from the truly observant accoucheur.

Analgesia in Labour.

Dr. W. M. LEMMON discussed the relief of pain in labour. Dr. Lemmon said that it was almost a century since Sir James Simpson, in 1847, used ether for that purpose and subsequently replaced it by chloroform. In 1902 von Steinbuckel introduced the combination of morphine and scopolamine, and this was the commencement of a long list of drugs and combinations of drugs which were used to alleviate the suffering of the parturient. Kotz and Kaufman in 1944 had reviewed the methods in current use in American clinics, and had found that in spite of individual variations there were six basic methods: (a) the use of paraldehyde; (b) the rectal use of an ether in oil mixture; (c) the rectal administration of "Pentothal Sodium"; (d) the use of morphine and scopolamine; (e) the use of the barbiturates; (f) continuous caudal anesthesia. A surprising omission from this list was the use of chloral hydrate in combination with potassium bromide, which had been found most useful in the early stages of labour.

Discussing paraldehyde, Dr. Lemmon said that, given rectally or orally, it resulted in satisfactory analgesia and amnesia in 85% or more of cases if it was used in combination with morphine or barbiturates, but was not nearly so useful alone. Rosenfield and Dividoff in 1935 used paraldehyde in combination with "Nembutal" in a series of 300 cases; but the dosages used—six to thirteen grains of "Nembutal" and

six to twelve drachms of paraldehyde—were much above what was now regarded as safe. Kotz and Kaufman used it also with morphine, the average dose being 11/60 of a grain of morphine and 17.5 drachms of paraldehyde. The nauseous taste and odour of paraldehyde limited its usefulness when given by mouth, and rectal administration of analgesics was not favoured in Melbourne because of soiling of the field and the tendency to proctitis. In spite of this, paraldehyde was one of the least toxic of drugs, with a large margin of safety between the therapeutic and toxic doses, and it justified more extensive employment than at present.

Dr. Lemmon went on to say that the rectal administration of oil and ether mixtures in combination with barbiturates or morphine and scopolamine, as suggested by Gwathmey, was credited with satisfactory results, but had not been used to any extent in the Women's Hospital. Special supervision was necessary, and this limited the usefulness of the method. "Pentothal Sodium" given rectally had been reported on with favour, especially for *multipara*, but the method had not been used in the hospital. Morphine and scopolamine, the first of the analgesics employed, although suffering at times a temporary eclipse, had stood the test of time. Experience in the method was necessary for good results, but when this was present, it was most satisfactory for *primigravida*, the duration of whose labour was such that the child was unlikely to be born within four hours of the initial injection. If it was born within this time, the depression of the fetal respiratory centre by the morphine was sufficient to cause concern in the resuscitation of the child. Experience would indicate that the greatest danger lay between one and three and a half hours after the injection of morphine, and this greatly limited the usefulness of the method for *multipara*.

Dr. Lemmon went on to describe what he considered the most useful routine. Early in labour, chloral hydrate and potassium bromide, thirty grains of each, were given by mouth. When the cervix had been taken up and the os was beginning to dilate, hyoscine compound A or B was given, according to the estimate of probable progress. Two hours later one two-hundredth of a grain of scopolamine was given, and this dose was repeated every two hours or less often if the patient did not appear to require such dosage. The room should be darkened, and disturbance of the patient minimized. For this reason memory-tests which entailed disturbing the patient twice should be used sparingly. A substitute for such tests, which had been found useful when one was in doubt, was to ask the patient to oppose the two index fingers about six inches in front of the eyes. If this was easily and quickly performed, further scopolamine was required. Various substitutes for morphine in this method had been used from time to time—for example, heroin or "Dilaudid"—without great benefit, although heroin was used much more than morphine as a routine sedative in the hospital. The latest substitute suggested was demerol hydrochloride, which had just become available on the Australian market under the name of "Pethidine". This drug had properties analogous to both the morphine and atropine series, and had apparently little depressant action on the fetal respiration. Schumann had reported 1,000 cases in which the drugs were given to *primigravida* and *multipara*, the later receiving the drugs by the intravenous route whenever it was estimated that delivery within two hours was likely. In this series the administration of demerol was repeated with that of the scopolamine at intervals of four hours. Results quoted were satisfactory, and reports from Britain by Gallen and Prescott confirmed this finding. Further experience with the drug should prove of interest.

Dr. Lemmon went on to say that barbiturates had a great vogue in the last decade, and numerous members of the group had been tried; but the most generally useful appeared to be "Nembutal". It had been used alone and in combination with other drugs, notably scopolamine and paraldehyde. Early American reports gave large doses, up to fifteen grains or more, with an initial dose of four and a half to six grains repeated as required; but later reports reduced the maximum total dosage to nine grains. Lundgren and Bruce, in 1940, experimented with "Nembutal" and scopolamine, "Nembutal" and paraldehyde, and "Nembutal" alone, and found the combination with scopolamine the most effective. Their maximum dose was six to seven and a half grains of "Nembutal" with 1/150 grain of scopolamine, which is more in keeping with experience in this country.

Dr. Lemmon then outlined what he considered the most useful method for *primigravida*. Early in labour chloral hydrate and potassium bromide, thirty grains of each, were given. When the cervix had taken up and the os was beginning to dilate, three grains of "Nembutal" were given, followed in half to three-quarters of an hour by 1/150 grain

of scopolamine. The administration of "Nembutal", one and a half grains, alone or with scopolamine (1/200 grain) might be repeated as required at intervals of three or four hours; but the maximum total dose of "Nembutal" should not exceed seven and a half grains. For *multipara*, "Nembutal" might be used in the reduced dosages now employed, as the same depression of the fetal respiratory centre did not occur as with morphine; but the dosage should be less—for example, one and a half grains as an initial dose, followed in half an hour by another one and a half grains if the effect was insufficient. Scopolamine, 1/150 grain, might be given at any time from one hour after the initial dose. This amount was often sufficient, but another 1.5 grains of "Nembutal" might be given in three or four hours if necessary. This had been found to be a useful routine method of sedation for *multipara*.

Dr. Lemmon then said that the barbiturates had certain disadvantages; for example, restlessness and even delirium were noted at times, and certain people were abnormally susceptible to them. But in spite of these drawbacks they were widely used at present, and were still among the most useful analgesics in labour.

Referring to continuous caudal anaesthesia, Dr. Lemmon said that in the last few years continuous caudal anaesthesia had been given an extensive trial in America. Two techniques had been used: (a) repeated injections through a malleable needle; (b) continuous drip administration through a urethral catheter inserted through a number 13 gauge needle, the needle being then withdrawn. The solutions used had been "Metycaine", 1.5% in isotonic saline solution, and procaine, 1% in isotonic saline solution. The injection was made into the sacral canal below the dural sac. The amount of solution injected was forty mls, and repeated injections of twenty mls every thirty to forty minutes to maintain anaesthesia were advised. The analgesia was perfect in the majority of cases, but the risks were many, and fatalities and "close calls" had been so numerous that the method had been abandoned in many clinics. The main danger was the injection of the solution into the subarachnoid space, and the suggested safeguards—(a) aspiration of the needle prior to injection and (b) preliminary injection of eight mls of solution, with a delay to see whether symptoms of spinal anaesthesia ensued—seemed to be uncertain, as fatalities had occurred in spite of their employment. Infection was also a danger, and deaths had been reported. Intravenous injection of the drug, which could not always be avoided, might also prove fatal. The necessity for the constant attendance of a specially trained anaesthetist proved yet another disadvantage. In conclusion, Dr. Lemmon said that Greenhill's final remarks in "The 1943 Year Book of Obstetrics and Gynecology" were worthy of quotation: "At the risk of being called an ultra conservative, I believe that, despite its auspicious start, continuous caudal anaesthesia will not become part of our general obstetric armamentarium."

Anaesthesia in Childbirth.

Dr. G. SIMPSON gave a demonstration of anaesthetic apparatus. Discussing anaesthesia in childbirth, he said that the pioneer and outstanding personality in this field was Sir James Young Simpson, of Edinburgh, who against great opposition obtained recognition of the case for anaesthesia in childbirth. Not only did Simpson establish the value and effectiveness of obstetric anaesthesia, but he established the right of women to demand relief of pain during labour—a right not now challenged in any quarter. It was the practice in the Women's Hospital for delivery to give anaesthetics to all women. The problem of anaesthesia in labour was one still requiring much research and investigation. There had been too much tendency to regard a half-hearted surgical anaesthesia as being all that was required. The problem was closely bound to that of analgesia and sedatives in labour. It was not practicable to have an anaesthetist continuously present throughout labour, so the problem was concerned with the search for an anaesthetic that could be given by an untrained person, by a midwife, or by the patient herself. The conditions required were: (i) painless childbirth, (ii) no harm to mother or child, (iii) the possibility of administration by an unskilled person. The Midwives Regulations in Victoria gave rather negative assistance. Article 40 made the following statement: "No midwife shall (c) administer an anaesthetic to a patient unless under the personal supervision of, and in the immediate presence of a legally qualified medical practitioner."

Dr. Simpson went on to say that the ideal anaesthetic agent and method of administration answering all requirements

had not yet been found, but by various surgical anaesthetics and other means satisfactory relief could be given in all but exceptional cases. It was well established, but not satisfactorily explained, that women in labour took anaesthetics well. Anaesthetic death had hardly to be considered, and this allowed for carelessness, which was bad. There was no excuse for commencing the administration of an anaesthetic without proper resuscitation measures available—oxygen, "Coramine", mouth gag *et cetera*.

Referring to surgical anaesthetics in general use, Dr. Simpson first discussed chloroform. He said that this was Sir James Young Simpson's anaesthetic, in use now for nearly 100 years and still in the front rank. It might be given on an open mask or folded towel (rag and bottle method). It might also be given by means of an inhaler. With a Junker inhaler it might be self-administered. When the patient was anaesthetized, she stopped pumping and got no more. It had also been given in capsules, which were broken by the patient and inhaled. The dangers of chloroform were well known. They were (i) acute chloroform poisoning, (ii) delayed chloroform poisoning, (iii) burning of the face from contact with liquid chloroform, and (iv) the danger of post-partum hemorrhage due to uterine relaxation; moreover, chloroform was not to be used in toxæmia, heart disease or shock, nor was it to be used carelessly, and free air and airway must always be maintained. The advantages of chloroform were: (i) quick, pleasant, easy induction; (ii) quick analgesia, with no struggling in induction; it was particularly useful for patients under sedation with hyoscine; (iii) no mucous secretion; (iv) good relaxation, which was necessary for manipulations—for example, internal version; (v) ease of transport, as small amounts were required; (vi) non-inflammability—it could be used in bedrooms with open fires; (vii) safety of use in pulmonary tuberculosis. For some reason chloroform in Victoria was discredited and seldom used. The hospital was blamed for discouraging its use; but that was not their present teaching. Chloroform was used for all *primipara* and for induction of anaesthesia in most cases in the labour ward, except when it was contraindicated. The position was well summed up in the following terms by a special committee of the Royal College of Obstetricians and Gynecologists appointed in 1933 to investigate the use of analgesics in midwifery:

Chloroform by any method should not be used by midwives acting alone. This conclusion has been reached with regret, but both immediate and delayed dangers, which are well recognized, occurred in this investigation, and it is not possible fully to guard against such occurrences if the administration is in inexperienced hands.

This finding should not, however, be taken as prejudicing the use of chloroform by registered medical practitioners, who, aware of the dangers, can take precautions to lessen the risks.

Dr. Simpson said that the falling off in the use of chloroform was a mistake and a pity; but its reintroduction would require careful training of those who were now used to pouring on ether *ad libitum* without fear of consequence.

Dr. Simpson went on to say that at present ether was the most used anaesthetic. It was considered safe and fool-proof; but although there was little risk of overdose, there were real dangers of post-anaesthetic pulmonary complications. Ether might be given by open mask or by vapourizing machine. Two vapourizers were available—the ether machine and the Oxford vapourizer. These both allowed safe administration by the midwife or by the patient herself. The dangers of ether were mainly due to inhalation of mucus or vomitus. The patient was often badly prepared, not having been starved, and having had no preliminary atropine. She might be "fighting mad" from hyoscine. She was lying in the left lateral position—a bad position for anaesthesia. If massive pulmonary collapse occurred, the correct treatment was immediate bronchoscopy and aspiration of bronchi.

Referring to nitrous oxide, Dr. Simpson said that during the first World War a combination of nitrous oxide and oxygen was established as the safest surgical anaesthetic agent. It was not thought of in obstetrics because of its cost and because of the unsuitability of machines for administration. What was required in labour was an intermittent anaesthetic to be given when the pains occurred. This was provided by the McKesson machine or with the Australian "Austox D.M.". The "Austox" machine had been on the market since about 1930. It was a most satisfactory machine for the administration of nitrous oxide and air or oxygen during labour. Its only disadvantage was lack of portability, due not so much to weight as to the essential awkwardness of its disarticulated parts. In 1932 Dr. R. J. Minnitt, at the request of the Liverpool Maternity

Hospital, had undertaken to investigate means of giving relief for the pains of childbirth. The result of Dr. Minnitt's research was the Minnitt machine, first made available in September, 1933, which allowed self-administration of nitrous oxide and air in a fixed concentration of 45% of gas. Wide publicity had been given to the Minnitt machine and to this method of obstetric analgesia, which until the war was being used extensively in England. In the investigation by the Royal College of Obstetricians and Gynaecologists in 1934, 3,865 cases of anaesthesia by the Minnitt method were included. It was considered that there was no added risk to mother or child, but satisfactory analgesia was claimed in only 77%. However, in a series of 1,025 cases presented by Minnitt himself between 1933 and 1935, 92% of satisfactory results were claimed. The committee of the Royal College of Obstetricians and Gynaecologists in its report concluded that: "Gas and air administration by the Minnitt apparatus is safe and satisfactory, although the apparatus is expensive and gas costly. It is recommended that its use be extended." Dr. Simpson went on to say that while nitrous oxide and air were suitable for analgesia and anaesthesia in most normal cases, the concentration of nitrous oxide given did not allow deep anaesthesia and was inadequate in some cases for normal delivery. It was insufficient for forceps deliveries. After three or four breaths of pure nitrous oxide had been inhaled, analgesia was produced in sixteen seconds. Labour pains lasted for only half a minute to one minute, so to obtain any effect it was most essential to commence the administration of nitrous oxide and air just before the pain started. This required training of the patient. Minnitt advocated training before confinement, so that the mask might be applied to the face and the inhalation commenced without delay. It also precluded the use of other sedatives, which dulled the pain and prevented the patient from making an early start with the anaesthetic. If nitrous oxide and oxygen were used, 5% of oxygen would keep the patient free from cyanosis if only three or four breaths were taken. This mixture, if inhaled at the first indication of pain, would give analgesia and a short sleep after the pain was over. In the second stage the patient should hold the last breath and bear down. It was important to take deep breaths. The percentage of oxygen must be increased if longer periods of anaesthesia were required. When necessary ether might be introduced to deepen anaesthesia. A puff of pure oxygen might be given after delivery fully to oxygenate the baby. The advantages of the method were that it did no harm to mother or baby, and did not slow but in fact quickened labour. It was the best anaesthetic for toxæmic or shocked patients, and was also suitable in pulmonary tuberculosis. While in the analgesic state the mother was fully cooperative, but anaesthesia could easily be deepened as required. The disadvantages of the method were the awkward equipment, the danger that gas cylinders might be empty when required, the fact that the mechanical apparatus might not be understood by the staff, and the cost. Much greater use should be made of gas, and in the larger maternity hospitals the apparatus should be understood by the staff and used more frequently.

Dr. Simpson then said that spinal anaesthesia was not used at the hospital, and he could see no case for its use. Intravenous anaesthesia had only special application—for example, for manual removal of the placenta in severe shock or in tuberculosis. Local anaesthesia had an application in certain cases only, for example, in breech deliveries episiotomy was performed under local anaesthesia so that the full pushing power of the mother might be preserved. The common misuse of anaesthetics was in the giving of too little or too much. In one labour ward there was a text: "My grace is sufficient for thee." This was not appreciated by most patients. Patients were sometimes told by their experienced friends to yell their hardest or they would not get an anaesthetic. That was surely a discredit to obstetricians. On the other hand, an anaesthetic was abused if it was used merely to hold back a normal delivery till the obstetrician could arrive to be a witness. Light anaesthesia was best except for intrauterine manipulations.

Dr. Simpson said that no survey of anaesthesia would be complete without reference to training in relaxation before confinement, which it was held allowed painless childbirth, or to hypnotism, which appeared to be much used in Russia. Hypnotism would seem to hold great attraction at the present time, for it could be administered satisfactorily by telephone. There was thus a wide range of tried and tested anaesthetic agents from which to choose. There were indications, contra-indications and dangers. The method of administration and the working of apparatus must be understood by both obstetricians and midwives. Whatever method was employed,

the aim was a healthy baby and an undamaged mother, and further, a mother whose comment would be, "How marvelous it is to have a baby"—not, was often heard, "Never again".

The Management of Labour.

Dr. R. M. ROME dealt with some points in the management of labour and the delivery of the child. He stressed the importance of full instruction of the patient as to what to expect when labour commenced and as to when she should proceed to hospital. In the case of the *primipara*, the patient should go to hospital when pains occurred regularly at intervals of approximately fifteen or twenty minutes. A multiparous patient should be admitted to hospital if the membranes ruptured, or at the first sign of abdominal discomfort associated with uterine contractions. Occasionally difficulty was experienced in ascertaining whether labour had commenced. In "true labour", pains commenced in the back and were usually associated with a "show" of blood, and throughout their duration the uterus was firmer and more prominent in outline. Rupture of the membranes was often difficult to detect, but if it had occurred the hair of the fetus could sometimes be felt and slight displacement of the head would produce a gush of *liquor amnii*. Indicators were sometimes useful, particularly bromthymol blue (0.2% in alcohol), which gave an alkaline reaction if liquor had swept through the vagina. Smears from the vagina could be shown by the Sudan method to contain fat from the vernix.

During the first stage of labour the patient should be encouraged to walk about and could be occupied with reading and knitting until the pains become more severe, when she should be kept in bed. The pains during the first stage were usually short and not of the "bearing down" variety. The patient should not be permitted to attempt to hurry labour along by pulling on a towel or pushing against part of the bed. Sleep should be encouraged (with the aid of sedatives) during night-time.

During the second stage the pains were more frequent, each lasted longer and they are associated with "bearing down". The patient should be confined to bed and sedatives and anaesthesia might be used.

Dr. Rome mentioned several points concerning delivery of the baby, which he said were useful when remembered by the practitioner. There was little chance of finding the chin until the anterior fontanelle was clear of the perineum, and it was often found to one or other side between the anus and coccyx. If difficulty was experienced, the Ritgen manoeuvre might be helpful. In the delivery of the head, the perineum should not be touched by the fingers, and an attempt to deliver the head between pains was always associated with less damage to the soft parts of the mother. Delivery of the anterior shoulder might be difficult, but it was often of advantage to apply pressure in Kristeller fashion, or better still, to apply pressure above the pubis in a caudal and backward direction. If this proved unsuccessful, it was sometimes helpful to turn the patient quickly into the dorsal position. Dr. Rome also mentioned the importance of diet during labour. He said that the average patient required 2,000 Calories and 3,000 mls of fluid per day during labour, but solid food was best avoided. An adequate intake of food and fluid was necessary to maintain the strength of the mother, to forestall acidosis and to aid in the prevention of obstetric shock.

Management of the Third Stage of Labour.

Dr. W. D. SALTAU said that there should be no need to emphasize the importance of the proper management of the third stage of labour, not only on account of the maternal mortality associated with the accidents of this stage, but also because of the effects on the immediate and sometimes the remote well-being of the patient. Proper management promoted a smoother convalescence during the puerperium, and the patient was less liable to infection and she nursed her baby better. Retention of pieces of placenta and membrane might be the cause of puerperal infection, resistance to which was lowered by any severe grade of anaemia. There was no question that excessive haemorrhage might be produced by improper conduct of the third stage, and quite rightly this was mentioned in the textbooks as the most frequent cause of post-partum haemorrhage. There was a certain amount of blood loss associated with the normal third stage, but the aim of the obstetrician should be to limit this to the absolute minimum. Whitridge Williams found that in 1,000 consecutive spontaneous labours the average blood loss was 343 mls. Any loss exceeding 600 mls should be considered abnormal.

Dr. Saltau briefly reviewed the phenomena that took place immediately after the end of the second stage. He said

that there was a pronounced sudden reduction in the size of the uterus due to retraction with thickening in the muscular wall of the uterus. This caused constriction and kinking of the vessels in the placental site. Until contractions returned, one largely depended on these phenomena for the control of hæmorrhage in the early part of the third stage. Once contractions recurred, whether immediately or within a few minutes, one had a reinforcement of Nature's method for limitation of hæmorrhage in the early third stage. If these functions were not efficient, then this was the time when there was apt to be some over-distension of the uterus with blood, and Dr. Saltau thought that it was at this stage that some control of the fundus was indicated. The sudden diminution in the size of the uterus predisposed to separation of the placenta from its attachment, and with the oozing of blood from the placental site, this led to the formation of the retroplacental clot. This represented the so-called Schultze mechanism in placental separation, when the placenta tended to present at the vulva by its fetal surface. In this case there was frequently little or no hæmorrhage until the stage of expulsion. Whether the placenta separated by this method, or by the Duncan method involving separation at its edge and a rolling-up into the longitudinal axis of the uterus, was immaterial as far as the management of the third stage was concerned. However, the latter method was more likely to be accompanied by slight continuous hæmorrhage until the placenta was away.

Dr. Saltau said that obstetricians had had it drilled into them that the essential part of the management of the third stage was the control of the fundus—that the hand should rest lightly on the fundus to elicit information as to whether the uterus was contracting or whether the fundus was filling up. If the control of the fundus was limited to this light pressure, no harm was likely to result; but there was always the temptation to do something more. On occasions, perhaps whilst the obstetrician was sucking mucus from the baby's mouth or tying the cord, he had asked sisters what the fundus was doing, only to note with apprehension that instead of lightly palpating it, they made a grab at an apparently elusive fundus, and then if it eluded them, made another grab and perhaps proceeded to massage it at the same time. The light pressure became converted into unnecessary meddlesome interference. As he had pointed out before, in the early minutes of the third stage they were depending for control of hæmorrhage on muscular retraction with constriction of vessels, and there was also the formation of the retroplacental clot of the Schultze mechanism to be considered; so it could readily be appreciated that unnatural interference with the uterine function at this stage might be a menace. Apart from the following-down of the fundus when the baby was born and the maintenance of light pressure for the first minute or two of the third stage, Dr. Saltau said that he sometimes wondered whether this so-called control of the fundus was really necessary. Unless the patient was obese the fundus could usually be visualized, and one could note the amount of external hæmorrhage. If necessary, intermittent light palpation of the fundus should suffice. As to the actual expulsion of the placenta, if the usual textbook signs of placental separation were present—fresh hæmorrhage, lengthening of the cord, increased mobility of and rise in level of the fundus—then all was well, and the placenta could be expressed by the so-called Dublin method in the average time of fifteen to thirty minutes or sometimes less; this was in contrast to Credé's method, which was the squeezing from the uterus of a placenta which might be still partly attached. Thus, within reasonable limits, and in the absence of continuous hæmorrhage, they should wait until some of these signs of placental separation were present. However, an American professor of obstetrics, Leroy Calkin, of Kansas University, from the observation of two signs which he stated had not been previously emphasized—(i) an alteration in the shape of the uterus from a flattening to a more globular shape, and (ii) a slight escape of blood—maintained that the placenta in almost 70% of cases separated in five minutes or less, and pointed out that this was in sharp contrast to the older idea of fifteen, twenty or thirty minutes for the duration of the third stage. He suggested expulsion of the placenta when these signs were present, rather than a delay for the lengthening of the cord *et cetera*. By the original method formulated by him in 1861, Credé expressed the placenta with the first contraction of the uterus in four to eight minutes. This was rightly condemned by his fellow obstetricians as being unphysiological. They stated that the uterus emptied too rapidly, it filled with clots, the tendency to late hæmorrhage was increased, the primary hæmorrhage was great and retention of fragments of placenta and mem-

brane was more common. With these observations Dr. Saltau thought all were in agreement. At the other extreme, Ahlfeld, in 1882, proposed a purely expectant plan of treatment. The uterus was not touched unless in the case of profuse hæmorrhage, the patient was placed over a hole in the mattress, and the escaping blood was caught in a funnel and led to a graduated vessel under the bed. The obstetrician sat at her bedside watching her face, counting her pulse and occasionally taking note of the amount of blood lost. If the placenta did not come away in two hours, the patient was asked to bear down, and if she did not expel it, then it was expressed. Dr. Saltau thought that the busy modern obstetrician could hardly be expected to fall in with these ideas, so the happy medium was adopted of expression by the Dublin method, usually within half an hour. In the large majority of cases the third stage could be terminated in this way after good contraction and provided that some, if not all, of the signs of placental separation were present. No manipulation or interference with the fundus should be carried out until these signs were present, unless, of course, hæmorrhage occurred, when the fundus should be massaged to stimulate contractions. Dr. Saltau went on to ask how long they were to wait, in the absence of undue hæmorrhage and without the recognized signs of placental separation. At the end of half an hour he thought it permissible to massage the fundus and see if the placenta would come away. If not, one had to be patient and wait; but even if there was still no hæmorrhage after an hour, he considered it a fair thing to try a Credé expression. If this was unsuccessful, then one was probably dealing with the problem of the retained placenta, and this problem, along with that of post-partum hæmorrhage earlier in the third stage, was really outside the scope of the discussion. The early obstetricians occasionally resorted to pulling on the cord at the same time as they exerted pressure on the fundus. This procedure had naturally been discarded at the present time; but Dr. Saltau thought that when the placenta could be seen in the vagina, to lift it out by the cord, provided the fundus was under control, was not without its advantages. He had the impression that the membranes came away better, and there might be this added advantage. One noticed that occasionally when the placenta was pushed right out ahead of the contracting fundus, the uterus tended to settle into the pelvis. This seemed to lead to imperfect contraction, control and massage of the fundus became more difficult, and he had seen further hæmorrhage associated with this condition which might have been avoided. One had to remember, too, the extra strain on the uterine supports, which tended to result from too forcible pushing down of the fundus. With regard to the delivery of the membranes, Dr. Saltau did not think it mattered much whether they were twisted or gently levered out by a see-saw movement; but the main thing was patience.

Dr. Saltau then said that there was one other thing which should be avoided after the placenta had been expelled. Quite correctly one made sure that the uterus was firm by suitable massage; but sometimes one saw sisters continuing to massage a fundus which was already firm. This did more harm than good. Once the fundus was in good contraction, it should be left alone. If there was much subsequent relaxation, it could be massaged at intervals and any clots expelled. The importance of preservation of warmth of the patient could not be unduly stressed. Too often obstetricians tended to allow the patient to become cold whilst they were waiting for the termination of the third stage. In most labour wards there was a sterile catheter on the instrument tray, and even if there was no obvious collection of urine in the bladder, it never did any harm whilst one was waiting for placental separation to swab the vulva and pass the catheter. It eased one's mind as to a possible cause of delay in the third stage. The routine administration of pituitrin and occasionally ergometrine was wise, especially in these days of busy labour wards and shortage of staff. One could leave one's patient with an easier mind. There should be no need to mention the routine inspection of placenta and membranes, and perineum for laceration. In the event of incomplete membranes or retained placental fragments, the only indication for exploration of the uterus was the proved *placenta succenturiata*.

Episiotomy and Perineal Repair.

Dr. G. BEARHAM said that one aim of the obstetrician should be to starve the gynaecologist. He said that the woman's perineum and vagina should, after childbirth, be as near as possible anatomically to what it was immediately before conception. To attain this end he thought it necessary that during delivery the head should not be allowed to traumatize the perineum. He did not permit the head to

stretch the perineum for longer than an hour in a *primigravida* or half an hour in a *multigravida*, and if he noticed that with each contraction as the head impinged on the perineum there was a trickle of blood running over the perineal edge, then unless delivery was effected after an episiotomy, the perineum would be badly torn. Dr. Bearham said that sometimes he was able to deliver a comparatively large head in a *primigravida* without any obvious perineal tear, only to find later that the woman complained of stress incontinence. This was due to submucous tearing of the pubo-cervical fascia in the anterior vaginal wall, with a resultant laxity of the bladder and urethral supports. During delivery of the head, on occasions, he had noticed a crack appearing in the skin of the perineum between the perineal edge and the anus. In these cases, to avoid a deep uncontrolled perineal laceration, he performed an episiotomy. He had found that by performing an episiotomy either in anticipation of an inevitable perineal tear, or when a tear had commenced, or if the perineum was being stretched to such a degree that the underlying fascia was likely to be torn, he had been able to give the patient a nearly normal vagina and perineum *post partum*. Dr. Bearham said that he had always performed an episiotomy at the equivalent situation on the perineum of 5 o'clock or 7 o'clock on a watch face. As a rule he took the incision down to muscle, but not through muscle; only rarely was it necessary to incise the muscle. The episiotomy was performed by inserting the blunt-pointed blade of a sharp pair of scissors beneath the appropriate part of the perineum between the fetal head and the perineum, and then cutting. This is done after an appropriate antiseptic, such as Bonney's blue, had been applied to the perineum. He had found that if the perineum was rigid and good contractions were occurring, hot sterile moist flannels applied to the perineum would reduce its rigidity and often save the necessity of a forceps delivery.

Dr. Bearham said that, in a forceps delivery, before applying the blades, if the perineum was rigid, he always hooked the gloved lubricated index and middle fingers of his right hand over the edge of the perineum, and gently but firmly, with a side-to-side rocking motion of the hand, ironed out the perineum. Too much force should not be used in this manoeuvre, or else the object of delivery of the foetus without damage to the perineum would be defeated. As the lubricant, he preferred sterile glycerin to anything else. In his experience he had found that lacerations often completed the third stage of labour (a) in the cervix, (b) running on either side or both sides of the urethral orifice and about a quarter to half an inch lateral to the urethral orifice, (c) running from the perineum towards the vaginal vault in the postero-lateral vaginal wall, (d) involving the perineum. The last-mentioned tears of the perineum could be divided into three degrees: (a) a first degree tear, which involved only the skin of the perineum and mucous membrane of the posterior vaginal wall; this tear meant that some fibres of the levator fascia had been torn; (b) a second degree tear, which extended down to the muscle, but did not involve the muscle; (c) a third degree tear, which involved the muscle and extended into the rectum. In Dr. Bearham's opinion it was necessary always after completion of the third stage of labour carefully to examine the perineum and vagina for any evidence of tears, and if any were found, to repair them immediately. In his opinion, if a laceration of the cervix was accompanied by severe bruising of the cervical tissue, unless hæmorrhage occurred from this area, it was best not sutured, but repaired some months later, as the bruised area generally sloughed. However, if hæmorrhage from the cervix was obvious, this had to be controlled by sutures. Tears involving the *labia minora* or running lateral to the urethral orifice had to be sutured with interrupted sutures, so as to bring the torn edges into apposition. Number 2 plain gut was the best suture material for tears of this type. Tears involving the posterior vaginal wall should be sutured with interrupted Number 2 chromicized gut sutures.

Dr. Bearham said that in dealing with first, second and third degree tears of the perineum he found it necessary to bring the torn tissues accurately together in layers, using Number 2 chromicized gut for interrupted sutures. He found it best to do this with the patient in the lithotomy position or in the dorsal position with the legs abducted and flexed, as in these positions, particularly the former, it was easier to obtain correct apposition of the tissues, although in the case of first and second degree tears the left lateral position was used by many. Although many obstetricians did not worry about suturing first degree tears, he thought that they should be sutured. In the third degree tear the rectal mucous membrane should be sutured with interrupted sutures of Number 2 plain gut. The sphincter

should be sutured with a figure-of-eight suture in two layers of Number 2 chromicized gut. The remainder of the torn muscle should be sutured edge to edge with interrupted sutures of Number 2 chromicized gut. Torn fascia, mucous membrane and skin should be sutured layer to layer with interrupted sutures of Number 2 chromicized gut. In suturing an episiotomy incision, Dr. Bearham always used a similar technique, employing interrupted sutures with Number 2 chromicized gut, and although this method took longer than a repair took when silk-worm gut was used, the end-result justified the extra time. As an antiseptic he always used Bonney's blue, as it was in his opinion more effective as an antiseptic and less irritating to the vulva than any other antiseptic. By way of after-treatment he always ordered a perineal toilet consisting of a wash-down with an aqueous solution of "Zephiran" (1 in 100) or "Dettol" (1 in 20), followed by drying of the suture line by dabbing it with sterile swabs and then either Bonney's blue, or spirit, after the patient voided urine, defecated or needed a perineal toilet. When a third degree tear was present he confined the bowels for six days, giving a non-residual diet, and on the night before they were to be opened, he gave one ounce of paraffin oil and two drachms of milk of magnesia by mouth, and five ounces of olive oil or olive oil substitute by rectum, and on the morning on which the bowels were to be opened an enema.

Points in Aseptic Technique.

DR. ARTHUR HILL discussed the aseptic conduct of labour. He said that although the attainment of complete asepsis might be impossible, an attempt should be made to approach it. The development of a sound aseptic technique required attention to detail. Dr. Hill stressed the following points. Whenever possible the delivery should take place in a single room, well ventilated and accessible to sunlight. All basins, sheets, towels, gowns, packs, swabs, masks, gloves and instruments employed during labour must be sterile. Efficient masking should be carried out by everyone who entered the delivery room. An efficient mask must have a sufficient number of layers of a material capable of arresting droplets, and should be worn to cover the nose and mouth, pass well under the chin and fit closely to the cheeks. The Jessop hospital mask fulfilled all these conditions, but almost without exception the locally made masks he had examined were deficient on one or more counts. A general tightening up of masking technique was essential if preventable infections during labour by group A hæmolytic streptococci were to be eliminated. A wise precaution was the application of "Dettol" cream to the patient's hands every three hours; this minimized the risk that the patient might infect herself with her hands during pains. Vaginal examinations should be reduced to a minimum and were rarely necessary in uncomplicated labour. Obstetricians should rely only on antiseptics of proven worth, used in adequate strength. The two best at present available for obstetric use were "Dettol" and "Zephiran" concentrate, the former to be used in a strength not less than one part in three of water, and the latter in a strength of at least one teaspoonful to the pint of water. Some minutes should be allowed for the antiseptic to act before one proceeded to examination or delivery. All soap must be washed from the operative field before "Zephiran" was applied.

At delivery the accoucheur should wear a cap and sterile mask, long-sleeved gown and gloves. After the external genitalia and surrounding area had been cleansed with swabs soaked in "Zephiran", the guards were applied. When the patient was in the left lateral position (as was generally adopted in Victoria), it was sufficient to apply one obstetric sheet, folded to at least double thickness, to cover the whole of the left lower limb below the vulva. This obstetric sheet should be of thick material, finely woven, and an excellent size was six feet by three feet six inches. Sheets were to be used in preference to multiple towels, which were almost always inefficient. It was important to remember that a soaked sheet or towel meant an unsterile sheet or towel. Delivery should be conducted with the accoucheur facing the vulva, and using his right hand to prevent too early extension or expulsion of the foetal head and his left hand to control the chin. By this method it was not necessary to fasten sterile guards around the patient's right leg or over her abdomen. The old domiciliary method of encircling the patient's right thigh with the accoucheur's left arm and forearm was unnecessarily cumbersome, almost inevitably destroyed asepsis, and, except when the patient was extremely difficult to control, should be abandoned. A perineal pad or double thickness of sheeting should be used to protect the left hand from the post-anal skin, and a similar protection should guard the hand from faecal

contamination when the perineum was being wiped back over the child's face.

After delivery, the child's respiratory passages could generally be cleared effectively by alternating the manoeuvres of suspending the child vertically from its feet and wiping out its naso-pharynx with gauze on the gloved finger. When aspiration of the naso-pharynx was indicated, it was best to employ a mechanical aspirator or delegate the duty to an assistant. When the accoucheur himself orally performed aspiration with a mucous catheter, this should be done on a separate sheet or towel away from the mother, and at its completion, if asepsis was to be maintained, the accoucheur must remask and rewash himself and reapply sterile gown and gloves.

When the umbilical cord was being ligated, the ligature on the maternal side was best applied inside the vagina, and the cord was then divided between the maternal and fetal ligatures and discarded. The cord was then out of the way during the suturing, and the risk of carrying infection from the anus to the perineum and vulva with movement of the cord was eliminated.

Before repair of a laceration or episiotomy wound, the genital and surrounding areas should once more be cleansed with swabs soaked in "Zephiran" solution, and one such swab could be placed temporarily inside the wound so as to cover its surfaces. A fresh sterile sheet or towel, folded longitudinally to double thickness, was now placed across the left thigh and folded back on itself so as to cover the lower part of the perineum and the anus. Towel clips fastened this sheet or towel to the left thigh, the perineum and the right buttock, so limiting the area of operative exposure and excluding the anus. A vaginal pack or rolled perineal pad, wrung out of "Zephiran" solution, was now used to plug the vagina deep to the wound, and suturing was then carried on in a dry field.

If 0.25 milligramme of ergometrine was injected intramuscularly at the time of delivery of the fetal head, the third stage of labour was commonly completed with the patient still in the left lateral position and before perineal repair had been commenced. At whatever time, however, it became necessary for the obstetrician to "take over" from the nurse and transfer his hand to the uterine fundus, he should place a sterile towel, folded to double thickness, between his hand and the patient's abdomen.

At conclusion of the third stage the accoucheur himself should complete the patient's toilet—cleansing the vulva, applying the sterile pads and assisting to change the bedding and apply the abdominal binder. He must not delegate these important duties to an assistant. Like the wise surgeon, he must leave the field of action only when to his personal satisfaction the wound site had been adequately cleansed, closed and covered.

Comments.

DR. JOHN GREEN congratulated the speakers on the excellent combination of the physiological and clinical aspects of labour. He was attracted by the suggestion of Dr. Hayes that in labour progress and pains were complementary—not only did unsatisfactory pains give poor progress, but conversely, poor progress might lead to unsatisfactory uterine action. Dr. Green felt that if the labour pains could be rectified, progress might then become more satisfactory. He described a lazy uterus, a tired uterus and an erratic uterus. For the lazy uterus the use of oestrogens was helpful, for the tired uterus a good dose of morphine was often followed by a revival of good contractions, and in the type of case associated with short, sharp pains, in which the uterus seemed to hug the baby, an antispasmodic such as "Spasmalgin" was a help.

With regard to sedatives, Dr. Green said that in a routine way he used morphine and hyoscine for *primiparae* and "Nembutal" for *multiparae*. For the *primipara* chloral hydrate and potassium bromide could be combined with the sedative if the patient was restless, and it was given as a routine measure to a *multipara* just before the first dose of "Nembutal". Dr. Green knew that hyoscine was given with the barbiturates, but was uneasy concerning this combination. Ether could be used as an analgesic towards the end of labour, and it was possible in many cases to ease pain and yet obtain some cooperation from the patient. Nitrous oxide and oxygen could be delightful for the patient, but self-administration could not be guaranteed. Nitrous oxide and oxygen had the great merit of not diminishing the power of the uterine contraction. This indicated the positive use for nitrous oxide, as distinct from its comfort effect, for those patients who lacked the physical and mental fortitude

referred to by Dr. Johnstone. In the case of such patients, who cried out for sedatives and yet went easily "out of labour", Dr. Green stopped all sedatives, relying on nitrous oxide and oxygen to ease the pain and allow progress to take place. With regard to continuous caudal anaesthesia, Dr. Green said that he could not resist referring, perhaps unfairly in his ignorance, to the comment of Howard James on spinal anaesthesia for tonsillectomy. Howard James quoted the remarks of Dr. Samuel Johnson on being shown a dog walking on two legs: "Sir, I perceive that it can be done, but it is not well done, the wonder is that it should be done at all."

Dr. Green said that he, like Dr. Bearham, employed episiotomy rather frequently, for he recollected several cases in which he had, so to speak, saved the perineum at the cost of overstretching the outlet. He thought that if forceps were not applied prematurely, the elaborate episiotomy of De Lee would not often be necessary. Contrary to the usual procedure, Dr. Green did his suturing with a couple of non-absorbable sutures, thereby minimizing anaesthesia and perhaps helping the third stage. He thought that the modern sedative plus anaesthetic management of labour increased the incidence of trouble *post partum*. In this connexion he reminded the meeting of the value of injection of the cord in cases in which the third stage was troublesome. For this reason he queried the suggestion made by Dr. Hill of cutting the cord inside the vagina; otherwise he reaffirmed the respect he had always held for the advanced theoretical and practical views of Dr. Hill on the prevention of sepsis.

DR. B. M. SUTHERLAND congratulated the speakers. He said that their discussions of the modern trends in obstetrics took his mind back to the old days, when patients were delivered in the home with untrained assistance and the practice of midwifery was not so pleasant. The introduction of the baby bonus had made it possible for mothers to enter hospital, and the speakers from the Women's Hospital had the advantage of every assistance and facility. In those days chloroform was the anaesthetic of choice, and he believed it still to be most useful. It was given a few drops at a time at the bedside, in much the same way as nitrous oxide and oxygen were given now. It had the advantage of making the patient quiet quickly, which was not so when ether was used. Dr. Sutherland had first commenced using morphine and hyoscine in 1907. The advantage of hyoscine was that it relieved the memory of events. It did not matter which of the numerous sedatives and anaesthetics was used, provided the attendant knew and attained proficiency in the one used. He thought caudal anaesthesia had only a limited use in large centres, and was not suited for general use or in the country.

For the young obstetrician the first requirement was to attain proficiency by practice in external palpation, using the different grips as outlined by Dr. Johnstone in determining the occiput and sinciput. If there was any doubt about external palpation, it was better to obtain all the information by one complete vaginal examination with proper surgical aseptic technique, and if necessary using an anaesthetic.

Dr. Sutherland pointed out a type of tear not mentioned by Dr. Bearham, in which the recto-vaginal septum and vaginal mucosa were transversely torn an inch or more within the vagina. It was the common practice at the time of Dr. Worrall and others to use silk-worm gut in all vaginal work including the cervix. Although brought up in this school, Dr. Sutherland had commenced using catgut exclusively in 1908. He had no cause for regret, and his patients were more comfortable, so that he now regarded silk-worm gut as out of date. Ironing out the perineum and careful watching of the third stage were essential parts of midwifery. Injection of the cord for retained placenta promised to be a valuable procedure, and Dr. Sutherland hoped that the hospital would bring forth its own statistics on the subject without referring to outside sources. The hospital produced a comprehensive medical report, which could to advantage be brought to notice more frequently.

DR. W. E. HEWITT said that he had been interested in injection of the umbilical cord with saline solution, 500 mls of hot sterile saline solution being injected by an ear syringe at the end of twenty minutes to half an hour. In forty cases he had found that the placenta almost invariably separated. There were two exceptions—one patient had had a manual removal previously, and the other was a *primipara* with an atonic uterus.

DR. J. HUTCHINGS said that at the Queen Victoria Hospital, injection of the cord as a routine measure immediately after

delivery had been tried in several hundred cases. The method used was by means of a French needle connected by rubber tubing to a milk bottle containing saline solution, which was displaced by air injected with a Higginson's syringe. It was found that the third stage was so shortened that the nurses were given a bad impression of its duration and did not obtain experience in its management. When the placenta was partially separated, the saline solution tended to run away rather than distend the placenta; but the result of the hot intrauterine douche was still effective. It failed in only a few cases, but the incidence of manual removal was much reduced.

Dr. W. J. McKillop considered that heroin was the most efficacious narcotic in labour; the patients settled down well, labour was quicker and fewer babies needed resuscitation than after the use of morphine. It was his opinion that rectal examination was a valuable means of assessing the progress of labour. In suture of the perineum he preferred catgut to non-absorbable material.

Dr. Elliott True, from the chair, expressed regret at the absence of Professor Marshall Allan owing to illness. Dr. True agreed with Dr. Sutherland that the hospital had valuable statistics on record, and asked members who were interested to write in any suggestions which the hospital staff would be pleased to discuss at some future meeting. He drew attention to the fact that there was a difference between hyoscine and scopolamine, scopolamine being the better, as it had less tendency to make the patient maniacal. He did not like the term "fixation of the presenting part", as it implied that it was not possible to "unfix" it. He thought "engaged" and "not engaged" were sufficient. In inviting the members to supper, Dr. True said that one definition of a symposium he had been able to find was that it was a banquet interspersed with intellectual discussion of a high standing.

Post-Graduate Work.

THE NEW SOUTH WALES POST-GRADUATE COMMITTEE IN MEDICINE.

PRINTED copies of the handbook "Facts about Rehabilitation for Medical Officers in the Services", compiled by the New South Wales Post-Graduate Committee in Medicine in conjunction with the New South Wales Branch of the British Medical Association, are now available on application to the Post-Graduate Committee, 131, Macquarie Street, Sydney, or to the New South Wales Branch of the British Medical Association, 135, Macquarie Street, Sydney.

For information on lectures for medical graduates application should be made to the Secretary, 131, Macquarie Street, Sydney. Telephones: BW 7483 and B 4606.

Attention is drawn to the following courses: course in gynaecology, February 18 to 22, 1946; course in obstetrics, February 25 to March 8, 1946; course in paediatrics, March 11 to 20, 1946; advanced course in surgery, continuing to March 30, 1946; advanced course in medicine, continuing to March 15, 1946.

These courses are available to all practitioners, and candidates desiring to enrol are requested to make early application, as the numbers will be limited.

THE MELBOURNE PERMANENT POST-GRADUATE COMMITTEE'S PROGRAMME FOR MARCH.

THE Melbourne Permanent Post-Graduate Committee announces the following programme for March, 1946.

University Classes.

University courses preparatory to the examinations for Part I of M.D. and M.S., and, if sufficient numbers present, for Part I of D.G.O., D.L.O., D.O., D.P.M., D.T.R.E. and D.D.R. will commence on March 13. The fee for each of these courses is thirty guineas.

Modern Methods and Technique in Teaching.

A course of five lecture demonstrations in teaching methods and technique will commence on March 14 at 8.15 o'clock p.m., and will continue on Thursday evenings until April 11 at the Melbourne University Arts Building. There will be no fee for this course.

Continuous Refresher Course.

Refresher classes, commenced in February, will be continued on Mondays, Tuesdays, Thursdays and Fridays of each week at the Royal Melbourne, Alfred, Saint Vincent's and Children's Hospitals. This course is for service and ex-service medical officers.

Course for M.D. (Part II) and M.R.A.C.P. Examinations.

The series of clinical lecture demonstrations designed for a higher qualification in medicine will be continued on Tuesday afternoons from 2.15 o'clock p.m.: March 5, by Colonel H. H. Turnbull on "Aortic and Coronary Disease"; March 12, by Dr. L. B. Cox on "Paraplegia"; March 19, by Dr. J. Horan on "Peptic Ulcer"; March 26, by Dr. E. G. Robertson on "Epilepsy".

Enrolments for courses should be made with the Secretary, Post-Graduate Committee, College of Surgeons, Spring Street, Melbourne, C.1, two weeks before the commencement of each course.

Correspondence.

THE CENTRAL HOSPITAL, MELBOURNE.

SIR: In your issue of January 5, 1946, you published a letter from Dr. C. H. Dickson, Secretary of the Victorian Branch of the British Medical Association, with a resolution of the Victorian Branch Council regarding Central Hospital.

The management of the hospital wishes to record its appreciation of the cooperation of the British Medical Association and to advise that this hospital will not have an out-patient department, and it is a feature of policy that all cases admitted on the recommendation of private practitioners should be referred back to them on discharge. Detailed clinical reports will be forwarded to the patient's medical attendant on discharge, and it is the earnest desire of the medical staff of Central Hospital to assist private practitioners in every possible way with details of investigations and treatment carried out at the hospital.

The general section of Central Hospital will be opened progressively as nursing staff becomes available, and it is anticipated that a medical ward will first be ready to receive patients on or about March 1, 1946. Beds for this ward may be booked through the Medical Director at any date henceforth.

Yours, etc.,

C. L. McVILLY, Administrator.

Central Hospital,
172, Lonsdale Street,
Melbourne, C.1.
January 30, 1946.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Colman, Jack, M.B., B.S., 1943 (Univ. Sydney), 81, Freddy's Road, Bexley.
Duval, Ferdinand, M.B., B.S., 1937 (Univ. Sydney), 135, Macquarie Street, Sydney.
Harker, Andrew Jennings, M.B., B.S., 1939 (Univ. Sydney), 7, Rawson Street, Epping.
Fisher, Gerard Maxwell, M.B., B.S., 1942 (Univ. Sydney), NX200861, Captain, 101 A.G.H., Australia.
Schuster, Elizabeth Mary, M.B., B.S., 1945 (Univ. Sydney), Broken Hill and District Hospital, Broken Hill, New South Wales.
Kirtle, Patricia, M.B., 1931 (Univ. Sydney), Broughton Hall, Leichhardt.
Taylor, John Lindsay, M.B., B.S., 1939 (Univ. Sydney), Prince Henry Hospital, Little Bay.

Naval, Military and Air Force.

APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 18, of January 31, 1946.

ROYAL AUSTRALIAN AIR FORCE
Citizen Air Force: Medical Branch.

The probationary appointments of the following Flight Lieutenants are confirmed: F. A. J. Hetherington (6381), J. N. Brown (267083), J. Kargotich (297400), K. G. Howsam (257504), M. J. Etheridge (257503), D. Hemming-Jones (277460), T. H. Gavin (277462).

Flight Lieutenant L. Kowadlo (257662) is transferred from the Reserve to the Active Force for full-time duties with effect from the 29th August, 1945.

Obituary.

GUY STUART L'ESTRANGE.

We regret to announce the death of Dr. Guy Stuart L'Estrange, which occurred on January 31, 1946, at Toowoomba, Queensland.

SIDNEY SOLOMON ROSEBERY.

We regret to announce the death of Dr. Sidney Solomon Rosebery, which occurred on February 1, 1946, at Sydney.

WILLIAM CAMAC WILKINSON.

We regret to announce the death of Dr. William Camac Wilkinson, which occurred on February 3, 1946, at Virginia Water, England.

NOTICE.

THE annual cricket match between the members of the Australian Dental Association and the British Medical Association in New South Wales will take place at the Sydney Cricket Ground on Wednesday, March 6, 1946. Medical men desiring to play should communicate without delay with Dr. Walter L. Calov, 157, Macquarie Street, Sydney.

Medical Appointments.

In pursuance of the provisions of *The Queensland Institute of Medical Research Act of 1945*, Sir Raphael W. Cilento has been appointed chairman, Dr. Abraham Fryberg has been appointed deputy chairman; and Dr. Aubrey D. D. Fye, Dr. George C. Taylor and Dr. Thomas V. Stubbs have been appointed members of the Council of the Queensland Institute of Medical Research.

Dr. E. S. A. Meyers has been appointed Medical Officer of Health of the South Coast Health District of New South Wales.

Books Received.

"Green Armour", by Omar White; 1945. Sydney, London: Angus and Robertson, Limited. 8½" x 5½", pp. 256. Price: 10s. 6d.

"War Neuroses", by Roy R. Grinker, Lieutenant-Colonel, M.C., and John F. Spiegel, Major, M.C., Army Air Forces; 1945. Philadelphia, Toronto: The Blakiston Company. 9" x 6", pp. 155. Price: \$2.75.

"The Red Centre: Man and Beast in the Heart of Australia", by H. H. Finlayson; 1945. Sydney, London: Angus and Robertson Limited. 7½" x 5", pp. 154, with illustrations. Price: 1s. 6d.

"Global Epidemiology: A Geography of Disease and Sanitation", by James S. Simmons, B.S., M.D., Ph.D., Dr.P.H., Sc.D. (Hon.), Tom F. Whayne, A.B., M.D., Gaylord West Anderson, A.B., M.D., Dr.P.H., Harold M. Horack, B.S., M.D., and collaborators; Volume One: Part One, India and the Far East; Part Two, The Pacific Area; 1944. London: William Heinemann, Limited. 10" x 7", pp. 534. Price: 30s. net.

Diary for the Month.

- FEB. 12.—Tasmanian Branch, B.M.A.: Ordinary Meeting.
FEB. 12.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
FEB. 19.—New South Wales Branch, B.M.A.: Medical Politics Committee.
FEB. 21.—South Australian Branch, B.M.A.: Council Meeting.
FEB. 21.—Victorian Branch, B.M.A.: Executive Meeting.
FEB. 22.—Queensland Branch, B.M.A.: Council Meeting.
FEB. 26.—New South Wales Branch, B.M.A.: Ethics Committee.
FEB. 27.—Victorian Branch, B.M.A.: Council Meeting.
FEB. 28.—South Australian Branch, B.M.A.: Scientific Meeting.
MARCH 1.—Queensland Branch, B.M.A.: Branch Meeting.
MARCH 2.—Tasmanian Branch, B.M.A.: Annual Meeting.
MARCH 5.—Federal Council, B.M.A., in Australia: Meeting at Sydney.
MARCH 5.—New South Wales Branch, B.M.A.: Organization and Science Committee.
MARCH 6.—Western Australian Branch, B.M.A.: Council Meeting.
MARCH 6.—Victorian Branch, B.M.A.: Branch Meeting.
MARCH 7.—New South Wales Branch, B.M.A.: Special Groups Committee.
MARCH 7.—South Australian Branch, B.M.A.: Council Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phoenix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 175, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All Public Health Department appointments.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

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